



Audiovisual Virtual Reality Distraction in Reduction of Pain and Anxiety Intention in Post-operative Patients: A Review Study

Maryo Yonatan Sengkeh, Nur Chayati*

Master of Nursing Program, Postgraduate Program, Muhammadiyah University, Yogyakarta, Indonesia

Abstract

Edited by: Eli Djulejic
Citation: Sengkeh MY, Chayati N. Audiovisual Virtual Reality Distraction in Reduction of Pain and Anxiety Intention in Post-operative Patients: A Review Study. Open Access Maced J Med Sci. 2021 Feb 18; 9(F):76-80. https://doi.org/10.3889/oamjms.2021.5728
Keywords: Post-operative; Distraction; Virtual reality; Pain; Anxiety
***Correspondence:** Nur Chayati, Master of Nursing Program, Postgraduate Program, Muhammadiyah University of Yogyakarta, Indonesia. E-mail: nchayati1983@gmail.com
Received: 18-Jan-2021
Revised: 01-Feb-2021
Accepted: 08-Feb-2021
Copyright: © 2021 Maryo Yonatan Sengkeh, Nur Chayati
Funding: This research did not receive any financial support
Competing Interest: The authors have declared that no competing interest exists
Open Access: This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0)

BACKGROUND: After surgery, patients could show psychological complaints such as worry, anxiety, pain, and depression. This condition could last for weeks and interfere with recovery, both psychologically and physiologically, if it is not getting proper and fast treatment. Patient relaxation may reduce post-operative pain, increase overall healing, and prevent hematoma and other complications.

AIM: This study aims to know the effect of virtual reality (VR) audiovisual distraction on decreasing pain intensity and anxiety of post-operative patients.

METHODS: This research was a literature review. The research source was taken from several databases, Google Scholar, EBSCO, PubMed, and ProQuest, with the keyword "audiovisual; VR; distraction; pain; anxiety, and post-operative." From the Google Scholar database, it was found 6060 articles, EBSCO found 194, PubMed found 50, and ProQuest 47. After going through the selection process, nine articles were found to meet the inclusion criteria.

RESULTS: Audiovisual distraction has a positive influence on pain relief and anxiety in post-operative patients. The transfer of pain could be done with a distraction method that diverts the patient's attention to other more comfortable and pleasant feelings.

Introduction

Surgery will cause unpleasant feelings, pain, and anxiety [1]. Pain and anxiety management in pre-operative and post-operative patients is needed. Patients who get pain management during pre-operative have more controlled behavior and feel better comfort than those who do not [2]. There are two ways to cope with post-operative pain and anxiety. Those are called the pharmacological and non-pharmacological pain management [3]. Distraction and relaxation techniques became one of the most effective pain management techniques from other techniques in non-pharmacological methods. Distraction techniques consist of various methods [3]. In the study review, the visual and audiovisual distraction techniques have better effects than other techniques [4].

Visual distraction will divert feelings of pain into observations and other visual actions related to visual intercourse [4]. This visual distraction technique usually uses virtual reality (VR) media to divert the patient's post-operative attention to the pain. The visual distraction allows the patient to interact with an environment simulated by a computer (computer-simulated environment) [4]. Visual distraction techniques will provide positive impulses to the brain to reduce pain reactions [5]. VR, which displays a simulation of a beautiful natural environment and follows

patients' interests, can provide a non-pharmacological analgesic effect [6].

Research by Kuhlmann *et al.* found that audio distraction can reduce pain perception [2]. The stimulation of the brain is well controlled so that it reduces pain perception. Whereas other research explains that audiovisual in the form of humor and anxiety video humor in 80% of patients studied postoperatively, the distraction of humor video makes the brain two different things [6]. Those are pain and anxiety with a happy cuteness [6]. It gives the brain stimulation that is divided so that the stimulation of pain is not so great.

A study found that audiovisual distraction can reduce the use of painkillers [7]. Cacau *et al.* revealed that pharmacological analgesics harm post-operative patients who can interfere with hepatic and renal work [6]. Pharmacological analgesic effects often cause advanced pain, such as nausea and stomach pain. Furthermore, non-pharmacological techniques are needed to ensure improved pain management with minimal side effects as complementary [6].

Discussions related to pain management and non-pharmacological analgesia techniques are very interesting for further research. Distraction produced by audiovisual is thought to reduce the intensity of pain and anxiety in post-operative patients. However, review of

papers which discuss the effectiveness of VR intervention to cope with pain and anxiety for post-operative patient is limited. Hence, this research will analyze how audiovisual distraction can reduce the intensity of post-operative pain and anxiety patients. The study was conducted by analyzing primary sources related to the theme.

Research Method

This research is a review study design, following inclusion and exclusion criteria.

Inclusion criteria

The researcher used some inclusion criteria in choosing a study, which becomes a literature review of this research. Those criteria are as follows:

- Research related to the audiovisual VR distraction technique conducted in post-operative patients
- Research texts can be in the form of English or Indonesian from a trusted database
- The year of publishing the current articles from 2012 to 2019.

Exclusion criteria

Incomplete publications such as abstracts, editorials, and reviews are not used.

Literature search

The literature search was conducted in February 2020. Researchers searched using four sources of Google Scholar publication databases, ProQuest, Ebsco, and PubMed keywords used were post-operative, distraction, VR, pain, and anxiety. The search was validated in the period of 2012–2019 to obtain current and valid sources. Then, the journal is extracted by two researchers independently. Journal titles and abstracts stored in international databases are searched using existing keywords; from the Google Scholar database found 6060 articles, EBSCO found 194, PubMed found 50, and ProQuest 47. Only nine articles met the inclusion criteria and were calculated for review in this research (Figure 1).

Results and Discussion

Nine articles which were included in the final review showed that VR was implemented at any type

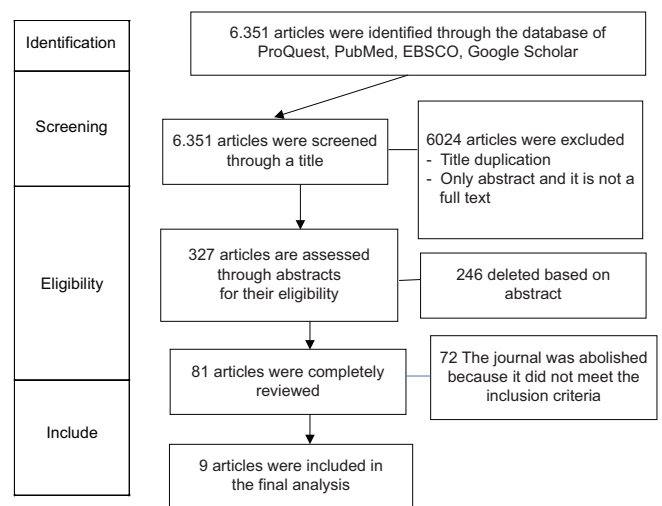


Figure 1: The process of reviewing and analyzing the article

of operative procedure, namely hemorrhoidectomy, cardiac surgery, laparotomy, heart surgery and colonoscopy. Moreover, VR might be used for adult age and children age population. The effectiveness of VR in pain reduction was measured by Visual analog scale in mostly studies. And it showed that VR has significantly reduce pain and anxiety level for post surgery patients (Table 1)

Pain is a normal condition after surgery, means as an uncomfortable feeling and such hurt in a part of the body [8]. Pain also defined by International Association for the Study of Pain as unpleasant emotional experience related to tissue damage that happened individually in certain period [9]. Pain management is an essential intervention for the patient's recovery [4]. Kuhlmann *et al.* explained that analgesics became the most critical method performed postoperatively [2]. Besides using the drug as pain relief, non-pharmacological agents are now regarded as a more safe method. Non-pharmacological interventions are based on the gate control theory, which states that pain impulses can be regulated or inhibited by defense mechanisms and the central nervous system. This theory says that pain impulses are delivered when a defense is opened, and impulses are inhibited when a defense is closed [10]. The efforts to close the defense are the basis for the theory of pain relief. A balance of activity from sensory neurons and descendent control fibers from the brain regulates the defense process. Non-pharmacological interventions based on the theory can be back massage, changes in position, emotional support, and distractions that provide comfort for the patient [11].

Other problems besides pain, post-operative patients also had high anxiety about the pain they faced. About 74% of post-operative patients who complained of pain behaved uncontrollably due to anxiety [10]. Furthermore, interventions carried out before surgery have been shown to control patient behavior after surgery is complete significantly [10]. Post-operative audio distraction gives patients comfort and makes them more relaxed [10].

Table 1: The study of the effect of audiovisual reality techniques on pain intensity and post-operative patient anxiety

Author	Aim	Research design	Participant	Instrument	Pain measurement result	Stress measurement result
Jie <i>et al.</i> [9]	To investigate whether the distraction of VR can reduce post-operative pain hemorrhoidectomy	Prospective random clinical test	188 patients. Divided into two groups. 1. A control group that accepts standard pharmacological analgesic interventions 2. Control groups that used VR and augmented analgesic intervention standards	Pain evaluation using visual analog scale (VAS)	Immersive VR is useful as a painkiller combined with standard pharmacological analgesia in patients who have undergone hemorrhoidectomy	-
Jose <i>et al.</i> (2014) [10]	VR cyber therapy reduces post-operative pressure and pain in patients who have recently undergone cardiac surgery	One-group pretest-posttest experiment.	67 patients. Twenty-five women and 42 men. Assessment after the first 24 h post-operative action	The subjective assessment using a Likert pain scale VR visualization is by playing videos with sets of environmental themes such as Dream Castle, Forest, Snowy Mountains, Driving, Walking, and Cycling. VR usage duration is 30 min	The pain was detected lower in patients who intervened in post-operative cardiac VR distraction. 59 patients (88%) reported a decrease in post-treatment pain levels from severe to a moderate pain scale	Anxiety factors measured from physiological changes such as heart rate and respiratory rate, 25 patients (37.3%) experienced a decrease in heart rate, 35 (52.2) experienced a decrease in mean arterial pressure, and 14 (64%) of 22 patients tested respiratory rate has decreased
Jiang <i>et al.</i> (2015) [1]	Test the visual and audiovisual distraction effects on pain, anxiety, and tolerance of procedures among patients who have undergone colonoscopy while operating	Random prospective clinical test	180 patients were divided into three groups 1. The group watches without sound and uses earphones 2. The group watches with sound and uses earphones 3. Control group	Pain assessment using visual analog scale (VAS) and for anxiety using State-Trait Anxiety Inventory (STAI) Visual and audiovisual distraction methods used are by playing Videos such as scenes, animation, comedy, romantic, historical figures, animal world, Kung Fu films, war films, and drama subjects choose from among these discs according to their preferences	Pain scores were lower in visual distraction (M = 4.89, SD ± 2.80) and audiovisual distraction group (M = 4.51, SD ± 2.26) compared to the control group (M = 5.16, SD ± 2.90) but did not reach a significant difference	No significant differences were found between the three groups for anxiety and anxiety before the procedure. The level of anxiety after the procedure was significantly lower than before the procedure in the three groups
Cheryl <i>et al.</i> (2016) [12]	Examine the effectiveness of audiovisual interventions (AV) in reducing pre- and post-operative anxiety in children	Randomized controlled trials (RCTs) systematic review	18 cases are identified			AV interventions can be useful in reducing anxiety before and after surgery in children. Video, multifaceted programs, and interactive games seem to be most effective, while music therapy and internet programs are less effective
Srinivasan and Muralidharan (2016) [13]	The effects of comedy videos have on post-operative pain	Experiment quotation	90 patients 1. A control group that accepts standard pharmacological analgesic interventions 2. A control group that uses humorous videos and added standard analgesic interventions	Evaluation of pain using the visual analog scale (VAS) evaluated every 3, 6, 12, and 24 h Comedy videos are played next to their beds from the moment they enter the post-operative recovery room	Video visual humor screenings significantly affect post-operative pain management, as evidenced by a 50% reduction in analgesic requirements in those who watch humor videos	
Hotopoglu <i>et al.</i> (2018) [14]	The impact of pre-operative audiovisual distraction has on anxiety and post-operative behavior disorder in children.	Experiment quotation	99 patients. Divided into three groups. 1. Audiovisual group 2. Hearing group 3. Control group	Evaluation using M-YPAS (Modified Yale Pre-operative Scale Anxiety) contains 22 items in five categories (activity, emotional expression, arousal, arousal of parental involvement) and PHBQ (post-hospitalization behavioral questionnaire) contains a total of 27 items in six subscales: general anxiety and regression, separation of anxiety, eating disorders, aggression toward authority, apathy, and sleep anxiety		Anxiety and behavior of post-operative patients tend to be better in groups who get audiovisual intervention before operative. Post-operative audiovisual distraction makes children have controlled behavior
Mordeca <i>et al.</i> (2016) [8]	Assess whether the use of novel visual and interactive video distractions can reduce pain	Porcelain-controlled clinical trials.	52 post-operative gynecological patients. The two groups division, the first group of 26 people used the Navimed application, and the second group 26 people reported directly to nurses	Utilizing tools (Navimed) in reporting the feeling of pain by themselves	Ninety percent of patients feel that interactive video distraction reduces the anxiety level and the aftereffect of gynecology	

(Contd...)

Table 1: (Continued)

Author	Aim	Research design	Participant	Instrument	Pain measurement result	Stress measurement result
Cacau <i>et al.</i> (2013) [6]	The visual reality distraction evaluation is in post-operative heart patients	Quasi-experiment	60 patients. Divided into two groups. Evaluations were carried out before and after the operative	Assessment using FIM (functional independence measure), by 6 min walking test (6MWT) and Nottingham health profile (NHP)	There is a significant decrease in pain scores. It is also found higher energy in the evaluation before distraction. However, there are no significant differences in emotional, physical ability, and social interaction	
Saritas <i>et al.</i> (2019) [15]	Knowing the effect of watching visual Turkish comedy films on post-operative pain and anxiety in surgical oncology patients	Quasi-experiment	88 patients. Divided into two groups	The visual analog scale (VAS) for pain evaluation and evaluation of anxiety level using the State-Trait Anxiety Inventory (STAI) scale. Patients were asked to watch Turkish comedy videos through a computer or tablet with a video duration of 10 min	The results showed that watching Turkish comedy videos had a positive effect on pain reduction with the results at the time of the post-test 6.25 in the control group and 5.36 in the experimental group	At the anxiety level, the post-test showed that the experimental group got 37.54 results, and the control group 39.70 showed a significant difference between scores

VR: Virtual reality.

Pain management procedures use non-pharmacological audiovisual distraction directed at control over cognitive behavior. Audiovisual distraction helps patients better understand and know what they feel to divert their attention [7]. The research found that doctors and nurses distract the patient's attention to not always the pain [3]. These findings explain that there is a pleasant stimulus that can stimulate endorphin secretion so that the pain stimulus felt by the client is reduced. Pain relief is generally directly related to the active participation of individuals, the number of sensory modalities used, and the individual's interest in simulation. Therefore, stimulation of vision, hearing, and touch may be more effective in reducing pain than single sensory stimulation alone [1].

Psychological factors are also an essential part of the experience of pain [8]. A study found that relaxation obtained from audiovisual distraction reduces muscle tension and makes breathing calmer and more controlled. Furthermore, some music can be disturbing and can reduce subjective awareness [3].

Based on the reviewed literature, this audiovisual distraction works for all ages, both in children and adults [14]. Srinivasan and Muralidharan also mentioned that video distraction could be useful in female and male patients [13].

VR can be an additional treatment for rehabilitation protocols for post-operative cardiac patients [6]. Their research found benefits in functional performance, higher energy levels, less pain, and better healing abilities in patients undergoing heart operative. Distraction with VR could provide improved sensory motor and limb function in patients with sequel cerebrovascular accidents [6]. In another study explained that during post-operative rehabilitation of the heart, VR was able to reduce the time to reach the target heart frequency during treatment by adding motivation derived from distraction to the intensity of pain and anxiety of patients [10].

Anxiety in patients before surgery is a very harmful condition for rehabilitation and post-operative healing [12]. Audiovisual interventions in patients

before the operative give positive results in decreased pain, accelerated healing, and reduction of post-operative anxiety. Moreover, intervention in anxiety can continue with post-operative distraction. Post-operative pediatric patients' research finds positive results where post-visual operative audiovisual distraction makes children's emotions and behavior more controlled, low pain intensity, and reduces anxiety [12].

There are no strict standards in measuring pain and anxiety intensity [6], so overall studies above do not have the same standard. The audio and visual distraction is a pharmacological analgesic companion. Studies with standardization of measurements on pain and anxiety variables need to be done. Medical and nursing scholars need to set a clear platform for measuring pain intensity and how much anxiety can be measured.

Conclusion

Reviewed comprehensively showed positive proof that audiovisual distraction has a positive influence on the decreased pain and anxiety of post-operative patients by lowering their psychological stress. The pain transfer can be done by the distraction method that moves the patient's attention to other feelings, which are more fun and convenient. The next research can be done in certain moments considering other impacts, positive and negative, of using VR.

References

- Jiang X, Xiaolin L, Lan ZH. Effects of visual and audiovisual distraction on pain and anxiety among patients undergoing colonoscopy. *Gastroenterol Nurs*. 2015;38(1):55-61. <https://doi.org/10.1097/sga.000000000000089>

2. Kuhlmann AY, de Rooij A, Kroese LF, van Dijk M, Hunink MG, Jeekel J. Meta-analysis evaluating music interventions for anxiety and pain in surgery. *Br J Surg*. 2018;105(7):773-83. <https://doi.org/10.1002/bjs.10853>
PMid:29665028
3. Economidou E, Klimi A, Vivilaki VG, Lykeridou K. Does music reduce postoperative pain? A review. *Health Sci J*. 2012;6(3):365-77.
4. Matsangidou M, Siang CA, Sakel M. Clinical utility of virtual reality in pain management: A comprehensive research review. *Br J Neurosci Nurs*. 2017;13(3):133-43. <https://doi.org/10.12968/bjnn.2017.13.3.133>
5. Karendehi, SD. The effect of giving music on pain scale due to surgical injury treatment in postoperative patients. *eJ Nurs*. 2015;3(2):1-9.
6. Cacau LA, Oliveira GU, Maynard LG, Filho AF. The use of the virtual reality as intervention tool in the postoperative of cardiac surgery. *Braz J Cardiovasc Surg*. 2013;28(2):1-10.
7. Ibitoye BM, Oyewale TM. The use of distraction as a pain management technique among nurses in a north-central city in Nigeria. *Int J Afr Nurs Sci*. 2019;11:100158. <https://doi.org/10.1016/j.ijans.2019.100158>
8. Mordecai L, Frances L, Clarissa C. Self-managing postoperative pain with the use of a novel, interactive device: A proof of concept study. *Pain Res Manag*. 2016;2016(4):1-6.
9. Jie D, Yanyan H, Lishan C, Zhu B, Cai Q, Chen K, *et al*. Virtual reality distraction decreases pain during daily dressing changes following haemorrhoid surgery. *J Int Med Res*. 2019;47(9):4380-8. <https://doi.org/10.1177/0300060519857862>
PMid:31342823
10. Mosso-Vázquez JL, Gao K, Wiederhold BK, Wiederhold MD. Virtual reality for pain management in cardiac surgery. *Cyberpsychol Behav Soc Netw*. 2014;17(6):371-8. <https://doi.org/10.1089/cyber.2014.0198>
PMid:24892200
11. Hole J, Hirsch M, Ball E, Meads C. Music as an aid for postoperative recovery in adults: A systematic review and meta-analysis. *Lancet*. 2015;386(10004):1659-71. [https://doi.org/10.1016/s0140-6736\(15\)60169-6](https://doi.org/10.1016/s0140-6736(15)60169-6)
PMid:26277246
12. Chow CH, van Lieshout RJ, Schmidt LA, Dobson KG, Buckley N. Systematic review: Audiovisual interventions for reducing preoperative anxiety in children undergoing elective surgery. *J Pediatr Psychol*. 2016;41(2):182-203. <https://doi.org/10.1093/jpepsy/jsv094>
PMid:26476281
13. Srinivasan D, Muralidharan M. The effect of humor videos in alleviating post operative pain. *J Nurs Health Sci*. 2016;5(5):6-9.
14. Hatipoglu Z, Gulec E, Lafli D, Ozcengiz D. Effects of auditory and audiovisual presentations on anxiety and behavioral changes in children undergoing elective surgery. *Niger J Clin Pract*. 2018;21(6):788-94. https://doi.org/10.4103/njcp.njcp_227_17
PMid:29888729
15. Sarıtaş S, Genç H, Okutan S, İnci R, Özdemir A, Kizilkaya G. The effect of comedy films on postoperative pain and anxiety in surgical oncology patients. *Complement Med Res*. 2019;26(4):231-9. <https://doi.org/10.1159/000497234>
PMid:30921794