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The Effect of Virtual Reality on the Pain Intensity of Postoperative Laparotomy Patients

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Abstract

Postoperative laparotomy is commonly associated with acute pain that may reduce patient comfort and prolong hospitalization. This study examined the effect of virtual reality (VR) therapy on pain intensity in postoperative laparotomy patients. A pre-experimental one-group pretest–posttest design was conducted involving 10 patients selected through total sampling. The VR intervention was administered as a non-pharmacological distraction therapy using a head-mounted VR device displaying calming immersive audiovisual content. Each session lasted approximately 15–20 minutes and was provided once during the early postoperative period when patients were stable and able to follow instructions. Pain intensity was assessed before and after VR intervention and analyzed using the Wilcoxon signed-rank test. The results demonstrated a significant reduction in pain intensity following VR therapy ($p = 0.003$; $p < 0.05$). These findings indicate that virtual reality is an effective non-pharmacological intervention for reducing postoperative pain and may be implemented as a complementary therapy in hospital nursing care. Further studies with larger samples and different surgical populations are recommended to confirm these findings.

Keywords: Virtual Reality, Pain Intensity, Laparotomy, Distraction Therapy.

INTRODUCTION

Laparotomy, or celiotomy, is a surgical procedure involving an incision in the abdominal wall to access organs in the abdomen that are problematic, such as those affected by hemorrhage, perforation, cancer, obstruction, sepsis, peritonitis, or deteriorating clinical conditions (Amelia & Saputri, 2020; Brunicardi, 2015).

According to the World Health Organization (WHO), in 2020, approximately 234 million patients worldwide underwent surgery. In Indonesia, in 2021, surgery ranked 11th out of 50 disease patterns in hospitals, with 1.2 million surgeries, 32% of which were laparotomies (Kemenkes, 2021).

Laparotomy causes acute pain that affects sleep quality, patient comfort, and length of stay (Afifah et al., 2024). Post-laparotomy pain is an unpleasant sensory and emotional experience associated with tissue damage (IASP, 2020).

Andarmoyo (2017) states that post-laparotomy pain can be managed with pharmacological therapy (NSAIDs and opioids) and non-pharmacological therapy (relaxation therapy, compresses, and distraction). Distraction, including visual distraction using virtual reality media, reduces pain perception by stimulating the descending control system (Andarmoyo, 2017; Afifah et al., 2024).

Previous studies have demonstrated the effectiveness of virtual reality in reducing postoperative pain in various surgical populations, including orthopedic and obstetric–gynecological patients.

However, research focusing specifically on postoperative laparotomy patients with diverse surgical indications remains limited, particularly in Indonesian clinical settings. Moreover, the implementation of virtual reality as a routine nursing intervention in postoperative care at Gatot Soebroto Army Hospital has not been widely explored. Therefore, this study addresses the existing research gap by evaluating the effectiveness of virtual reality distraction therapy in reducing pain intensity among postoperative laparotomy patients.

Virtual reality is used to treat anxiety disorders, stress, eating disorders, and pain (Susilowati et al., 2023; Hofmann, 2017). Research shows that virtual reality interventions are effective in reducing pain in post-operative patients (Mawar et al., 2024; Thippabathuni et al., 2023).

A preliminary study at Gatot Soebroto Army Hospital showed that the use of virtual reality in post-laparotomy patients is still limited and requires further exploration. This study aims to investigate the effect of virtual reality on pain intensity in post-laparotomy patients and contribute to pain management (Afifah et al., 2024).

RESEARCH METHODOLOGY

This study was conducted at Gatot Soebroto Army Hospital, Central Jakarta, using a pre-experimental one-group pretest–posttest design. Data collection was carried out by administering a virtual reality intervention to postoperative laparotomy patients experiencing moderate to severe pain once daily for three consecutive days, two hours prior to analgesic administration, with each session lasting 10 minutes. Participants were postoperative laparotomy patients aged 18–60 years who were fully conscious (Glasgow Coma Scale 14–15) and reported moderate to severe pain as measured by the Numeric Rating Scale (NRS).

Pain intensity was assessed using the NRS before and after the intervention. The study population consisted of 10 patients, and a total sampling technique was employed.

The limited sample size represents a limitation of this study and may affect the generalizability of the findings. The data obtained were statistically analyzed using the Wilcoxon signed-rank test.

An ethical review was conducted by the Ethics Committee of RSPAD Gatot Soebroto (KEPK) with approval number 158/XII/KEPK/2024. This study was declared ethically appropriate in accordance with the seven WHO ethical standards (2011), including social value, scientific validity, fair distribution of benefits and burdens, risk minimization, avoidance of coercion and exploitation, confidentiality and privacy, and informed consent, as outlined in the CIOMS Guidelines (2016).

RESULTS

Table 1 Univariate Analysis of Demographic Characteristics of Respondents

Respondent characteristics		Frequency (*f*)	Percent (%)
Age	18 – 45 (early adulthood)	4	40%
	46 – 60 (middle-aged)	6	60%
Gender	Female	5	50%
	Male	5	50%
Type of work	Public sector	1	10%
	Private sector	0	0%
	Entrepreneurship	2	20%
	Not working	7	70%
Ethnic group	Java	9	90%
	Outside Java	1	10%
Total		10	100%

Source: Primary Data (2025), processed.

Based on Table 1, 60% of respondents were aged between 46 and 60 years old, with an equal number of male and female respondents, each accounting for 50% of the total. 70% of respondents were unemployed, and 90% of respondents were from the Javanese ethnic group.

Table 2 Frequency Distribution of Pain Intensity Pre- and Post-Test

Pre test			Post test	
Pain Intensity	Frequency (*f*)	Percent (%)	Frequency (*f*)	Percent (%)
No pain	0	0%	0	0%
Mild pain	0	0%	7	70%
Moderate pain	8	80%	3	30%
Severe pain	2	20%	0	0%
Unbearable	0	0%	0	0%
Total	10	100%	10	100%

Source: Primary Data (2025), processed.

Based on Table 2, the results show that the intensity of pain in the pre-test was 80% experiencing moderate pain, while in the post-test, 70% experienced mild pain.

Table 3 Effect of Virtual Reality on Pain Intensity (Wilcoxon Test)

Variable → *f*	Median	SD	Min-max	*P Value*
Pre-test pain scale→ 10	3,00	0,422	3,00 – 4,00	
Post-test pain scale→ 10	2,00	0,483	2,00 – 3,00	0,003

Source: Primary Data (2025), processed.

Based on Table 3, out of 100% of respondents, the average pain felt by respondents was moderate pain, while the average pain after intervention was mild pain. The p-value obtained was 0.003 <0.05.

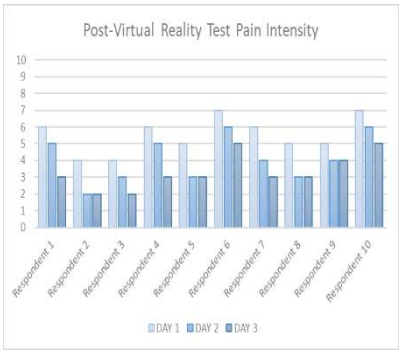

Figure 1 Post-Test Pain Intensity in Virtual Reality

Based on Figure 1, it can be seen that each respondent experienced a significant decrease in the intensity of pain in patients after laparotomy surgery after being given distraction therapy using virtual reality media from the first day to the third day.

DISCUSSION

The effectiveness of virtual reality (VR) therapy in reducing postoperative pain observed in this study may be influenced by several demographic characteristics, including age, gender, type of work, and ethnic background, although these factors were not statistically tested as predictors of VR effectiveness.

1. **Age**

Regarding age, the majority of respondents (60%) were aged 46–60 years. Previous research by Yadi et al. (2018) reported that individuals aged 45–55 years commonly experience pain perception, which is consistent with Andarmoyo's theory (2017) stating that aging is associated with structural degeneration and decreased organ and hormonal function, potentially altering pain perception. Despite these physiological changes, VR therapy remained effective in reducing pain intensity, suggesting that immersive distraction may still function effectively across adult age groups.

2. **Gender**

Gender distribution in this study was balanced, with male and female respondents each comprising 50% of the sample. Although previous studies (Yadi et al., 2018) reported a predominance of male respondents and suggested that gender may influence pain perception, the equal distribution in this study minimizes gender-related bias. This balance indicates that VR therapy may be equally effective for both male and female patients in reducing postoperative pain.

3. **Type of Work**

In terms of employment status, 70% of respondents were unemployed. According to Andarmoyo (2017), unemployed individuals may have limited engagement in activities that

support physical and psychological coping, such as regular exercise or structured pain management strategies, which can affect pain perception. In this context, VR therapy may serve as an effective alternative distraction technique to enhance pain coping mechanisms among patients with limited baseline coping activities.

4. Ethnic Group

With respect to ethnic background, the majority of respondents (90%) were of Javanese ethnicity. Andarmoyo (2017) suggests that ethnicity influences pain responses due to cultural differences in pain perception and expression. However, the limited ethnic diversity and absence of multivariate analysis in this study prevented further examination of VR effectiveness across different ethnic groups. Similar limitations were reported by Kusuma et al. (2019), in which most respondents were also of Javanese ethnicity.

Although these demographic factors may influence pain perception, this study did not aim to analyze their direct impact on the effectiveness of VR therapy. Furthermore, the small sample size of 10 participants and the pre-experimental design without a control group limit the ability to draw definitive conclusions regarding the moderating effects of demographic variables. Future studies are recommended to employ larger samples and multivariate analyses to examine whether age, gender, occupation, and ethnicity significantly influence the effectiveness of virtual reality–based pain management.

5. Pain Intensity Before and After Virtual Reality Therapy

On the first day after the virtual reality intervention, the average pain intensity of respondents began to decrease and continued to decline until the second day. A significant decrease occurred on the third day, with most respondents reporting much lower pain levels. These data indicate that the use of virtual reality as a non- pharmacological distraction technique effectively reduces postoperative pain gradually and consistently until the third day after therapy at Gatot Soebroto Army Hospital.

6. The Effect of Virtual Reality on Pain Intensity in Patient After Laparotomy Surgery

Patients undergoing virtual reality therapy were educated about the benefits and use of VR prior to therapy sessions. All respondents received visualizations of natural scenery accompanied by soothing music once a day for three days prior to analgesic medication. This therapy significantly reduced patients' pain and anxiety. The research by Islamiyah et al. (2024) and Andarmoyo's theory (2017) support the use of virtual reality to reduce anxiety and pain sensitivity by focusing attention on visual stimuli. Hofmann (2017) also states that VR is effective as a distraction technique to reduce pain. The researchers concluded that VR distraction therapy effectively reduces pain significantly.

7. Results of the Wilcoxon Pre-test – Post-Test Virtual Reality

The results of the study indicate that virtual reality therapy is effective in reducing pain intensity in patients following laparotomy surgery, with a p-value of 0.003. This aligns with the findings of Yadi et al. (2018), who reported significant differences

between pre- and post-intervention measures (p-value 0.002). The study by Thippabathuni et al. (2023) also supports the effectiveness of virtual reality in reducing post-operative pain (p-value 0.001). Virtual reality, as a distraction technique, effectively reduces pain perception by providing positive impulses to the brain, in line with Andarmoyo's theory (2017) and the research by Dewi & Masfuri (2023).

Practical Recommendations

Based on the findings of this study, virtual reality (VR) therapy can be considered as a complementary non-pharmacological intervention in postoperative pain management for laparotomy patients. Hospitals may integrate VR therapy into routine nursing care protocols, particularly during the early postoperative period prior to analgesic administration. Nursing staff should receive basic training on the use of VR devices, patient selection criteria, and safety considerations to ensure optimal implementation. Additionally, the use of standardized VR content, such as calming natural scenery and relaxing audio, is recommended to maximize the distraction effect. Implementing VR therapy has the potential to enhance patient comfort, improve patient satisfaction, and support holistic nursing care without increasing pharmacological burden.

CONCLUSION

Laparotomy surgery often causes acute pain that can be managed with non- pharmacological therapies, one of which is visual distraction therapy using virtual reality media. Virtual reality therapy is effective in reducing pain intensity in patients after laparotomy surgery. Before the intervention, the majority of respondents experienced moderate pain, but after the intervention, the majority experienced a reduction in pain to mild levels. Statistical analysis using the Wilcoxon test yielded a p-value of 0.003 < 0.05, indicating a significant effect of virtual reality therapy in reducing pain in post-laparotomy surgery patients at RSPAD Gatot Soebroto. This study aligns with previous research supporting the effectiveness of virtual reality in pain management and is expected to have implications for clinical practice in providing an effective and efficient alternative therapy.

SUGGESTIONS

It is recommended that hospitals consider implementing virtual reality therapy as part of standard postoperative nursing care for patients experiencing moderate to severe pain. Future research should involve larger sample sizes, include control groups, and apply randomized controlled trial designs to strengthen causal inference. Further studies are also encouraged to explore the influence of demographic and psychological factors on the effectiveness of virtual reality–based pain management across various surgical populations.

REFERENCES

1. Afifah, A. V., Cahyarini, L. L., & Juliandari, D. (2024). Pengaruh Teknik Distraksi 5 Jari Terhadap Tingkat Nyeri Pasien Post Operasi Di Bangsal Rawat Inap Rsu Mulia Hati Wonogiri [*The Effect of the 5-Finger Distraction Technique on Pain Levels in Postoperative Patients in the Inpatient Ward of Mulia Hati Wonogiri Hospital*]. *Jurnal Cakrawala Keperawatan*, 146 - 156.
2. Amelia, W., & Saputri, D. M. A. (2020). Efektifitas *Hand Massage* Terhadap Skala Nyeri Pada Pasien Post Operasi Laparatomi di RS. DR. Reksodiwiryo Padang [*The Effectiveness of Hand Massage on Pain Scale in Post-Laparotomy Patients at Dr. Reksodiwiryo*

Hospital, Padang]. *MIDWINERSLION Jurnal Kesehatan STIKes Buleleng*, *5*(1), 96 - 1-5.

3. Andarmoyo, S. (2017). Konsep dan Proses Keperawatan Nyeri [*Concepts and Processes of Pain Nursing Care*] (2nd ed.). Ar-Ruzz Media.
4. Brunicardi, F. C., Billiar, T. R., Dunn, D. L., Hunter, J. G., Matthews, J. B., & Pollock, R.
5. Dewi, E. S., & Masfuri, M. (2023). Manajemen Nyeri Distraksi Berbasis Virtual Reality (VR) [*Virtual Reality-Based Distraction Pain Management* (VR)]. *Jurnal Keperawatan Silampari*, *6*(2), 1827-1835.
6. E. (2014). *Schwartz's Principles of Surgery, 10th Edition* (F. C. Brunicardi, D. K. Andersen, T. R. Billiar, D. L. Dunn, J. G. Hunter, J. B. Matthews, & R. E. Pollock, Eds.). McGraw-Hill Education.
7. Hofmann, S. G. (Ed.). (2017). *Clinical Psychology: A Global Perspective*. Wiley.
8. *International Association for the Study of Pain* (IASP). (2020). *Classification of Chronic Pain." Pain Terms: A Current List with Definitions and Notes on Usage.*
9. Islamiyah, N. S. U., Puspito, H., & Muhaji, M. (2024). Pengaruh Pemberian Virtual Reality (VR) Terhadap Tingkat Kecemasan Pasien Pra Bedah Dengan Anestesi Spinal Di Rumah Sakit Pku Muhammadiyah Gamping [*The Effect of Virtual Reality (VR) on Anxiety Levels in Preoperative Patients Undergoing Spinal Anesthesia at PKU Muhammadiyah Hospital, Gamping*]. *Jurnal Ilmiah Kesehatan*, *13*(1), 20-33.
10. Kemenkes RI. (2021). Data Pembedahan Elektif [*Elective Surgery Data*]. Kementerian Kesehatan.
11. Kusuma, A. H., & Anggraeni, A. D. (2019). Pengaruh posisi head up 30 derajat terhadap nyeri kepala pada pasien cedera kepala ringan [*The effect of a 30-degree head-up position on headache in patients with mild head injuries*]. *Jurnal Ilmu Keperawatan Dan Kebidanan*, *10*(2), 417-422.
12. Susilowati, F., Hariyati, R. T. S., & Aryani, D. F. (2023). Penurunan Nyeri dengan Edukasi Menggunakan Teknologi *Virtual Reality* pada Pasien *Post-Operative : Literatur Review* [*Pain Reduction through Education Using Virtual Reality Technology in Post-Operative Patients: Literature Review*]. *Jurnal Integrasi Kesehatan dan Sains (JIKS)*, *5*(1), 52 - 59.
13. Thippabathuni, S., Dronamraju, V. A. C., Gara, H. K., & Vanamali, D. R. (2024). *Effectiveness of Virtual Reality Environment for Post-Operative Pain Management*. *Int J Recent Surg Med Sci.*, *10*.
14. *World Health Organization*. (2020). *Surgery Elective.*
15. Yadi, R. D., Handayani, R. S., & Bangsawan, M. (2018, Oktober). Pengaruh Terapi Distraksi Visual Dengan Media *Virtual Reality* Terhadap Intensitas Nyeri Pasien Post Operasi Laparatomi [*The Effect of Visual Distraction Therapy Using Virtual Reality Media on Pain Intensity in Patients After Laparotomy Surgery*]. *Jurnal Ilmiah Keperawatan Sai Betik*, *14*(2).