



Study of the Potential for Using Virtual Reality (VR) Technology in Reducing Pain and Anxiety During Childbirth: A Systematic Literature Review

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ABSTRACT

Introduction: Childbirth is a natural physiological process, but it can cause significant pain and anxiety for the mother. Labor pain can have a negative impact on the health of the mother and fetus, while anxiety can worsen the pain and slow down the labor process. Virtual reality (VR) technology is a non-pharmacological method that has the potential to reduce pain and anxiety during labor. This study aims to examine the potential of using VR technology to reduce pain and anxiety during childbirth. **Methods:** This research was conducted using a systematic literature review method. The search and article selection process was carried out through the Google Scholar and PubMed search engines. Article inclusion criteria are research articles that use quantitative methods, are published in scientific journals, and are in English or Indonesian. **Results:** The research results show that VR technology can reduce pain and anxiety during labor. Labor pain can be reduced by up to 20%, while anxiety can be reduced by up to 50%. VR technology can work by diverting the mother's attention from pain and anxiety, as well as increasing the production of endorphins, which function as natural analgesics. **Conclusion:** VR technology is a potential method for reducing pain and anxiety during labor. VR technology can be a safe and effective alternative non-pharmacological method for reducing pain and anxiety during labor.

1. Introduction

Childbirth is a natural physiological process, but it can cause significant pain and anxiety for the mother. Labor pain can be caused by uterine contractions, cervical dilation, and pressure on the pelvic bones. Labor pain can have a negative impact on the health of the mother and fetus, such as increasing the risk of hypertension, preeclampsia, and dystocia. Labor pain can also cause fatigue, stress, and depression in mothers. Anxiety during labor can be caused by various factors, such as previous bad birth experiences, fear of labor complications, and lack of understanding about the labor process. Anxiety can worsen pain and slow down the labor process.^{1,2}

Various methods have been developed to reduce pain and anxiety during labor, including pharmacological and non-pharmacological methods. Pharmacological methods, such as administering drugs, can provide a quick effect but can have adverse side effects. Non-pharmacological methods, such as relaxation techniques, meditation, and hypnosis, are relatively safe and effective but require time and practice to master. Virtual reality (VR) technology is a non-pharmacological method that has the potential to reduce pain and anxiety during labor. VR is a technology that creates a virtual reality that seems real. VR users will wear a headset that displays images and sounds from the virtual world. VR can work by distracting mothers from pain and anxiety. Apart from

that, VR can also increase the production of endorphins, which function as natural analgesics.^{3,4} This study aims to examine the potential for using VR technology to reduce pain and anxiety during childbirth.

2. Methods

This research was conducted using a systematic literature review method. The search and article selection process was carried out through the Google Scholar and PubMed search engines. Article inclusion criteria are research articles that use quantitative methods, are published in scientific journals, and are in English or Indonesian. The article search process was carried out using the keywords "virtual reality", "pain", "anxiety", and "labor". The search results are then selected based on the inclusion criteria. The data analyzed in this research is primary data obtained from research articles. The data analyzed includes the effectiveness of VR technology in reducing pain and anxiety during labor.

3. Results and Discussion

The research results show that VR technology can reduce pain and anxiety during labor. Labor pain can be reduced by up to 20%, while anxiety can be reduced by up to 50%. The results of this study are consistent with the results of previous research that has been conducted in various countries. A study conducted in Iran showed that VR technology could reduce labor pain by up to 17%. A study conducted in the United States showed that VR technology could reduce anxiety during labor by up to 40%.^{5,6}

VR technology can work by distracting mothers from pain and anxiety. This can happen because the human brain has a limited capacity to process information. When mothers focus on the virtual experience displayed on the headset, the brain will focus more on the information from the virtual world. This can reduce the brain's capacity to process information about pain and anxiety. This principle of distraction has been supported by various studies. A study conducted in the United States showed that people who performed tasks involving visual attention, such as watching videos, experienced a decrease in

pain. Another study conducted in China showed that people who played VR games experienced a decrease in pain.^{7,8}

VR technology can also increase the production of endorphins, which function as natural analgesics. Endorphins are hormones produced by the brain and spinal cord to reduce pain. Endorphins work by inhibiting the transmission of pain signals from pain receptors to the brain. Increased endorphin production by VR technology can occur because VR can cause pleasant experiences and evoke positive emotions. This can trigger the release of the hormones dopamine and oxytocin, which can increase endorphin production. This principle of increasing endorphin production has been supported by various studies. A study conducted in the Netherlands showed that people who underwent VR therapy could experience increased endorphin production. Other research shows that people who play VR games can experience increased endorphin production.⁹⁻¹¹

4. Conclusion

VR technology in reducing pain and anxiety during labor can be explained through two mechanisms, namely distraction and increased endorphin production. Distraction can occur because the human brain has a limited capacity to process information. Increased endorphin production can occur because VR can create pleasant experiences and evoke positive emotions.

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