Effect of virtual reality application on the delivery stages length and maternal satisfaction

Wafaa Kamel Sadek Abd El Rahman
Nursing fellow (woman's Health and Midwifery Nursing), students Hospital Mansoura University

Hanaa Abd Elhady Soliman
Lecturer of Women Health and Obstetric Nursing, Faculty of Nursing, Minia University

Nahed Mousa Saber
Assistant Professor of Maternal and Newborn, Faculty of Nursing, Beni-Suef University

Abstract---Background: One of the key measures of the caliber of care given is how satisfied mothers are with their birth experiences. The use of non-pharmacological treatments can make childbirth a pleasant experience for the mother. Aim: This study aimed to evaluate the effect of virtual reality applications on the delivery stages length and maternal satisfaction. Design: A quasi-experimental research design was used to conduct this study. Setting: The study was carried out at the labor unit in (the obstetrics & gynecology department) at Mansoura University Hospital Subjects and method: A purposive sample of 200 pregnant women was recruited in this study; the studied pregnant women were assigned into two groups, with 100 pregnant women in each group (the intervention (virtual reality) and control groups). Tools: two tools were used to collect data: Tool (1): A structured interviewing questionnaire and Tool (II): The Mackey Childbirth Satisfaction Rating Scale. Results: The present study revealed that the maternal childbirth satisfaction means score in the virtual reality group was higher than that of the control group (P< 0.001). The length of the active and second phases of parturition in the virtual reality group was significantly lower than that of the control group. Conclusion: The virtual reality application has a positive effect on decreasing the delivery stages length and enhancing maternal satisfaction among the studied pregnant women. Recommendation: Virtual reality could be applied as an alternative non-pharmacological therapy in maternity hospitals for a significant effect on delivery stages length and maternal satisfaction.

Introduction

An enormous crisis and stressful time in a woman's life are pregnancy and childbirth. The mother's emotional connection to the child as well as her physical and psychological well-being are all impacted by the quality of her parturition experiences. The quality of care and childbirth services provided have been linked in research conducted in recent decades to increased maternal childbirth satisfaction (Jha et al., 2017).

Labor is a sequence of genital organ processes that release a viable fetus from the uterus through the vagina. With contractions generating cervical dilatation, effacement, and progressively worsening pain, labor is a clinical process that is characterized by the ejection of the fetus and placenta after 20 weeks and after 500 g. (Sakala, 2020). Labor is broken down into four stages. The first stage of labor lasts the longest and contains three phases: latent, active, and transition. Regular uterine contractions start to occur and continue through cervical dilatation during the latent phase, When cervical dilatation reaches 4 to 7 cm, the active phase starts. When dilatation reaches 8 to 10 cm, the transition phase begins. The second stage starts when cervical dilatation reaches 10 cm and ends with delivering of the baby. The third stage or the- placental stage starts after the delivery of the baby and ends with the delivery of the placenta (Sel, 2019). Finally, the fourth stage is the first six hours immediately following the labor which emphasizes the importance of the close maternal observation needed at this time (Dutta & Groves, (2019).

Lack of satisfaction can cause postpartum depression, lactation problems, changes in the mother's attitude toward having more children in the future, and eventual changes in parturition with associated disorders. The possibility of techniques that can reduce pain throughout the delivery process can make childbirth a positively satisfying experience. Nonpharmacological and supportive interventions can improve the mental and emotional elements of childbirth, lower the rate of elective cesarean sections, and raise the statistics of natural labor among these modalities by lessening the intensity of pain and fear (Sayed et al., 2018).

Despite receiving treatment, when a pregnant woman experiences discomfort and stress, her sympathetic nervous system is constantly stimulated, which causes a rise in catecholamine release and, in turn, an increase in the number of pulses and systolic blood pressure. The increase in catecholamines can lower the blood flow from the mother to the fetus, which will ultimately lead to less efficient uterine contractions and longer parturition. Because of this, it is recommended to improve maternal and fetal outcomes to have a good impact on the mother's pleasure with delivery (Zare et al., 2017).

Reduced satisfaction with delivery and postpartum hemorrhagic diseases might result from prolonged delivery phases that are accompanied by maternal and fetal

difficulties including uterine contractile anomalies, fetal distress, low Apgar scores, and infant mortality (Fathi & Amraei, 2019) Therefore, efforts to lessen discomfort and decrease the duration of the delivery stages can increase the mother's pleasure with the process of giving birth (Kordi et al., 2018).

Pharmacological treatments to speed up labor are limited by maternal and fetal difficulties, thus more convenient, non-prescriptive approaches are preferred because they are less expensive and have fewer side effects. 10 Even though there are numerous approaches available today to make childbirth more pleasant, it is still important to find strategies that can be used more widely (Siddiquee, 2016). The cognitive-behavioral technique, in which the person's attention is diverted from a painful stimulus to external stimulation, is one of the non-medical interventions to diminish sensitivity (Indovina et al., 2018)

Watching virtual reality videos is a novel technique for thought divergence where the person in the virtual environment believes they are in the actual world. By enabling communication with the virtual environment, this technology helps users cope with pain and terror by diverting their focus from the physical world (Yokoyama et al., 2019). There are two types of distraction with virtual reality movies. Virtual reality reduces attention to real stimuli by putting specialized glasses with 360-degree relaxation films in front of the user's eyes (Tacgin, 2020). Virtual reality may be useful in deflecting attention from those who are in agony due to an injury, per one study.

According to a 2019 study, several independent studies have shown that virtual reality video watching is useful in reducing the length of delivery. There is still a lack of information about the effectiveness of non-pharmacological interventions in raising maternal labor satisfaction. A prior study found that the intervention group's mean first- and second-phase parturition durations were shorter than those of the control group (Yokoyama et al., 2019).

Significant of the study

 Labor is a long and uncomfortable process for women. The current gold standard for managing pain during childbirth is neuraxial blocking, which includes spinal, epidural, and combination spinal-epidural analgesia with all of its side effects. But improving the entire labor and delivery process for women is challenging, necessitating the provision of individualized care, such as alternative therapy. Since they are noninvasive and have no negative side effects, there is growing interested in nonpharmacologic procedures nowadays. By submerging users in a virtual environment created by a computer, virtual reality is a non-pharmacological therapy and one of the distraction strategies that take the place of the real world. VR makes use of all five senses to help patients better regulate their pain by directing their attention away from painful stimuli. This technique can help in reducing pain and can also be helpful with any discomfort after labor (Rezai, et al., 2016). VR is cost–effective, safe, effective in pain and anxiety control, can be used as a self-management tool for pain relief, and is affordable (Tacgin, 2020). Virtual reality was employed as a non-invasive, analgesic treatment in clinics that had few adverse effects and no drug addiction. So, this

study aimed to evaluate the effect of virtual reality application on the delivery stages length and maternal satisfaction.

Operational definition

Virtual reality (VR) refers to a computer-generated simulation in which a person can interact within an artificial three-dimensional environment using electronic devices, such as special goggles with a screen or gloves fitted with sensors. In this simulated artificial environment, the user can have a realistic-feeling experience (Tacgin, 2020).

Aim of the study

This study aimed to evaluate the effect of virtual reality application on the delivery stages length and maternal satisfaction.

Research Hypothesis

H1: Women who apply virtual reality are expected to have less delivery stages length than those who don't.
H2: Women who apply virtual reality are expected to have more maternal satisfaction than those who don't.

Study design

A quasi-experimental research design was used to conduct this study. This design is used to measure the grade of change that happen due to the effect of the intervention (Thomas, 2020).

Study setting

The study was carried out at the labor unit in (the obstetrics & gynecology department) at Mansoura University Hospital

Subjects

A purposive sample of 200 pregnant women was recruited in this study; the studied pregnant women were assigned into two groups, with 100 pregnant women in each group (the virtual reality group was a woman who used a virtual reality application, and the control group was a woman who received routine care). with the following inclusion and exclusion criteria: women with intact membranes, free from medical or obstetrics complications, women aged 18-30 years with gestational age between 37-42 weeks, and women in the active phase of labor who accept the VR intervention. Moreover, any women who deviated from normality were excluded from the sample.

The sample size calculated by the following formula was 203. But, for the accuracy of statistical measurements, the sample size will be 200. A total of 200 women were randomly divided into two groups (control group =100 women who

received routine care and intervention group =100 women who used virtual reality technology).

$$N= \text{sample}.\ n = \frac{N}{1+N\epsilon^2} \quad N= \text{population}. \quad e= \text{margin error } (0.05).$$

Tools of data collection

Two tools were used for collecting data:
Tool I- A structured Interviewing questionnaire: It consisted of two parts:
Part (1) Demographic data of women such as name, age, residence, level of education, and occupation.
Part (2) Obstetrical history of women such as current gestational age and number of previous abortions

Tool (II): The Mackey Childbirth Satisfaction Rating Scale

The Mackey Childbirth Satisfaction Rating Scale was developed to gauge how happy mothers were with their deliveries. On a five-point Likert scale, it covers 18 questions about delivery satisfaction that range from "extremely satisfied" (score 5) to "very dissatisfied" (score 1). Overall, scores of 1 to 22 indicate very dissatisfaction, 23 to 45 indicate dissatisfaction, 46 indicate satisfaction, and 69 indicate very satisfaction. The dependability of the Persian version of this scale was verified using the content validity approach, and Moody and others 4 validated it with an internal consistency of 0.78.

Pilot study

The pilot study was carried out. It involved ten percent of the total sample (20 women) to test the simplicity, feasibility, clarity, and applicability of the developed tools, and also to find out the possible obstacles and problems that might face the researchers and interfere with data collection. Women involved in the pilot were included in the study.

Tools validity

The tools of data collection were thoroughly reviewed by a panel of five experts including three from obstetrics and gynecological health nursing professors and two from obstetrics and gynecological medicine to test the content validity, modifications were carried out according to the panel's judgments on the clarity of sentences and the appropriateness of the content.

Tools Reliability

The reliability of tools was tested by using Cronbach's alpha coefficient test, which revealed that the tools consisted of relatively homogenous items as shown by the moderate to the high reliability of each tool. The reliability was 0.897.

Ethical considerations

The study aimed to explain to each woman the purpose and benefits of the study before applying the tools to gain their confidence and trust. Oral consent was obtained from each woman to participate in the study and withdraw when she needs. Confidentiality was ensured throughout the study process and the women were assured that all data was used only for research purpose. Each study subject was informed about time throughout the study.

Field of work

Upon obtaining official permission from the director of the previously selected setting, data was collected through four phases. The following phases were adopted to fulfill the aim of the current research: preparatory, assessment, implementation, and evaluation phases.

Preparatory Phase

The preparatory phase: It is the initial stage of the research was the preparation, which the researchers carried out by reviewing local and international related literature about the various facets of the research subject. This assisted the researchers in understanding the scope and gravity of the issue and served as guidance for the preparation of the necessary data-gathering methods. To gain the director of the previously chosen settings' consent to conduct the research after outlining its objective, an official letter from the dean of the faculty of nursing was submitted during this phase.

Assessment Phase

The researchers visited the chosen unit twice a week (Mondays and Tuesdays) from 8 am to 4 pm to conduct baseline interviews with the pregnant in the labor unit (obstetrics and gynecology department) in both the study and control groups. The researchers conducted interviews with women up until the specified sample size was reached among those who satisfied the inclusion criteria that were listed first. Before each interview, the researchers greeted the ladies, introduced themselves, and explained the goal and scope of the study. Oral informed consent to participate in the study was obtained from women who met the inclusion criteria. The data obtained during this phase constituted a baseline for further comparison to explore the usability of virtual reality for women during stages of labor and its effect on women's labor stages length and maternal satisfaction. The control group was assessed first to avoid contamination of the study between both groups and for ethical considerations.

Implementation Phase

Data were collected over 8 months from the beginning of June 2019 to the end of January 2020 at the selected unit in the obstetrics and gynecological department. The samples were randomly assigned to the virtual reality and control groups using sextet blocks, a non-random sampling technique that was applied in this study. Each block was given a number between one and six, and after listing the six

potential block states, a random number between one and six was chosen. After that, the participants were divided into the virtual reality group (A) and the control group (B) according to the block that matched the chosen number. The demographic and obstetrics history forms were filled up at the start of the trial using hospital records after subjects gave written informed consent.

Control group

- Routine care was given to the control group by the hospital staff.
- Collecting demographic data and obstetrical history using (tool I: structured interviewing questionnaire). The researchers asked questions in Arabic and recorded the answers on the sheet. This step took about (5 – 10 minutes) to be completed for each woman.
- Assessment of the progress of delivery stages length and maternal satisfaction was done.

Study group (virtual reality)

- Routine care was given to the study group by the hospital staff in addition to VR intervention.
- Assessing demographic data and obstetrical history using (tool I: structured interviewing questionnaire). The researcher asked questions in Arabic and recorded the answers in the schedule.
- The VR glasses had been sterilized with alcohol while using it between women to prevent a cross of infection.
- The virtual reality group utilized virtual reality goggles at two points during parturition: the start of the active phase (dilation of 4-5 cm) and the second phase (dilation of 7-8 cm). Twenty minutes were spent on each intervention. With mobile VR, which uses the phone's display to present dual stereoscopic views, participants in the virtual reality group were able to engage with 360° videos of natural sceneries like rivers, coastlines, waterfalls, and lakes as if they were actually in the real world (Pratwi, et al, 2017). The labor position for all the women was the lithotomy position. In the research process, the researcher recorded the duration of the active phase and the length of the second stage of child delivery in minutes. The Mackey Childbirth Satisfaction Rating Scale form was completed by all groups after their condition became stable in the postpartum section.
- Finally, the women in the virtual reality group were assessed for their satisfaction (Tool IV) regarding the usability of virtual reality.

Evaluation Phase

The Mackey Childbirth Satisfaction Rating Scale form was completed for both groups after their condition became stable in the postpartum section.

Administrative design

The necessary official permissions for data collection were obtained by submitting an official letter from the dean of the faculty of nursing to the administrator of the

study setting. The title and objectives of the study were illustrated as well as the main data item to be covered.

Statistical design

Before computer entry, the data were manually checked. Data tabulation and analysis were done after using the statistical package for social sciences (SPSS version 20) for that purpose. We used descriptive statistics (e.g., mean, standard deviation, frequency, and percentages). Analysis of significance (t-test, chi-square) when p <0.05, a significant level value was taken into account. A fairly important level value was also taken into account when p<0.01.

Results

According to Table 1, there were respectively 40% and 38% of participants in the control and virtual reality groups in the 18–24 age range, with mean ages of 23.05–3.81 and 23.66–4.67 years. Rural areas were home to (56%) of members of the virtual reality group and (58%) of members of the control group. Regarding schooling, it was evident that the virtual reality and control groups, respectively, had secondary education (48% and 52%). In terms of occupation, the virtual reality, and control groups, respectively, included 50% and 59 % housewives. In terms of demographic features, there was often no statistically significant difference between the virtual reality and control groups. That makes the two study groups homogeneous.

Table (2) displays that, there were no statistically significant differences between virtual reality and control groups according to their obstetrics history (p>0.05). As 58% and 60% of both virtual reality and control groups respectively had gestational age from (39-41 weeks). In addition, the majority (90% and 94%) of both virtual reality and control groups respectively had no previous abortion.

Table 3: Revealed that there was a significant difference between the two virtual reality and control groups regarding maternal childbirth satisfaction (P<0.001). Also, demonstrated that the mean score of the virtual reality group was significantly higher than that of the control group (P<0.001).

Table 4: Showed that the mean length of the active phase was significantly different between the two groups (P=<0.001) where this value in the virtual reality group was significantly less than that of the control group (P<0.001). The mean length of the second stage differ significantly between the virtual reality and control groups and the value in the virtual reality group was significantly less than that of the control group. The results indicated the efficacy of virtual reality.

The satisfaction with the VR application among pregnant women is explained in Table (5). According to the findings, most women were satisfied with the VR application (Total mean score percent = 83%). A small percentage of women (8.0% and 9.6%, respectively) were dissatisfied and highly satisfied with VR applications.

Table (1): Distribution of the studied sample in both control and virtual reality groups according to their demographic characteristics (n= 200)

Characteristics	Control group n=100		Virtual reality group n=100		Chi square test	P value
	No	%	No	%		
Age (in years)					.870	>0.05
18-24	35	35.0	45	42.0		
24- ≥30	40	40.0	40	38.0		
	25	25.0	25	20.0		
Mean ±SD	23.05±3.81		23.66±4.67			
Residence					.697	>0.05
Urban	48	48.0	44	44.0		
Rural	58	58.0	56	56.0		
Educational Qualification						
Pre-primary education	10	10.0	12	12.0	1.67	>0.05
Primary education	20	18.0	18	18.0		
Secondary school	55	52.0	48	48.0		
University education	25	20.0	22	22.0		
Occupational status					1.72	>0.05
Housewife	59	59.0	50	50.0		
Working	41	41.0	50	50.0		

Table (2): Distribution of the studied sample in both control and virtual reality groups according to their obstetrics history (n= 200)

Obstetrics history	Control group n=100		intervention group n=100		Chi-square test	P value
	No	%	No	%		
Gestational age in weeks					.506	>0.05
37-	24	24.0	26	26.0		
39-	60	60.0	58	58.0		
42	16	16.0	15	16.0		
Mean ±SD	39.33±1.22		39.39±1.33			
History of previous abortion					1.15	>0.05
No	94	94.0	90	90.0		
Yes	6	6.0	10	10.0		

A Statistical significant p ≤ 0.05A Highly Statistical significant p ≤ 0.001

Table 3: Mean scores of maternal childbirth satisfaction in both virtual reality and control groups

Variable	Virtual Reality	Control	P value
	Mean±SD	Mean±SD	
Delivery Satisfaction	79.76±5.52	68.43±4.66	<0.001

Table 4: Mean scores of the length of the delivery stages in both virtual reality and control groups

Variable	Virtual Reality	Control	P value
	Mean±SD	Mean±SD	
Active Phase Length (min)	282.12±51.04	306.52±65.55	0.001
Length of the Second Stage (min)	21.58±6.49	26.33±6.59	0.001

A Statistical significant p ≤ 0.05A Highly Statistical significant p ≤ 0.001

Table (5): Distribution of the studied sample in the virtual reality group according to their satisfaction with VR application (n=100)

Items	Non – satisfied	Satisfied	Highly satisfied
	%	%	%
Utilizing the application is simple	6.0	88.0	10.0
interest in the application	3.0	80.0	17.0
The application's level of immersion	12.0	82.0	6.0
The comfort of the VR headset	2.0	90.0	8.0
The degree of pain when wearing a head-mounted display (HMD)	11.0	75.0	14.0
How likely were they to suggest the application to other women?	10.0	80.0	10.0
Do you like to use a VR application in the next labor	10.0	81.0	9.0
Total mean percent	8.0	83.0	9.0

Discussion

In a physiological process called normal labor, the uterus contracts, and the cervical opening widens as the baby is delivered (London et al., 2021). In reality, labor pain is a side effect of a natural process rather than a symptom of damage or injury, and it has a variety of physical reasons (Simkin, 2020). VR is a non-pharmacological technique that is both safe and effective for enhancing mothers' pleasure, shortening labor, and enhancing comfort (Gur & Pay, 2020).

According to the current study, there was frequently no statistically significant distinction between the virtual reality and control groups. Regarding sociodemographic traits, there was uniformity between the two groups. According to the researchers, this may be due to that the studied sample was selected with a purposive random sample. This was beneficial to the present study as it ensured the homogeneity of two study population and the generalization of the study results as well as avoiding the effect of the confounding variables.

The findings of this study were comparable to those of Ebrahimian & Bilandi's (2020) study on "Comparations of the effects of watching virtual reality videos and chewing gum on the length of delivery phases and maternal labor satisfaction." Moreover, Amiri, et al., (2019) in "The influence of distraction tactics on pain and

stress during labor" found no appreciable differences in the sociodemographic features of the two groups.

The findings of Sahin and Basak's (2020) study on "The effects of intraoperative progressive muscle relaxation and virtual reality application on anxiety, vital signs, and satisfaction" corroborated the findings of the present study. The findings showed that neither group's age nor the level of education significantly differed from the other.

Regarding the history of obstetrics, the current study found no statistically significant changes between the virtual reality and control groups (p>0.05). From the perspective of the researchers, it was confirmed that the two study groups were comparable in terms of their obstetrics backgrounds. This helped the current study since it guaranteed the homogeneity of the two study populations, allowed for the generalization of the study results, and prevented the impact of confounding variables. The study's findings agreed with those of Ebrahimimani & Bilandi (2020), who found no significant variations in gestational age across the groups. Additionally, Gur & Apay (2020) found that the groups exhibit homogeneity and that there were no statistically significant variations in the obstetric factors between the two groups.

The current study showed that there was an improvement in maternal birthing satisfaction and a significant difference between the two virtual reality groups and the control group. It showed the advantages of applying virtual reality, according to the researchers. This finding is consistent with those of Ganji et al. (2017) who investigated "The effect of intermittent local heat and cold on labor pain and childbirth outcome" and Moghimi Hanjani et al. (2018) who investigated "The Effect of Local Heat Therapy Method on Pain, Child-Outcomes, births, and Rate of Satisfaction in Primiparous Women," both of which found that maternal childbirth satisfaction can be increased through women's empowerment and a sense of self-control in selecting and enhanced maternal childbirth satisfaction.

In terms of the length of the delivery stages, the current study revealed that the mean duration of the active phase varied dramatically between the two groups, with the virtual reality group's value being noticeably shorter than that of the control group. According to the researchers, the findings demonstrated the value of virtual reality. This finding is consistent with studies by Ganji et al. (2017) and Moghimi Hanjani et al. (2018), which found that watching virtual reality videos reduced the time it took for women to enter the active and second phases of labor.

In accordance with Ebrahimian and Bilandi's research published in 2020, the findings of this study showed that the intervention group's first active dilation (dilation 4-5) and second (dilation 7-9) phases of labor were significantly shorter than those of the control group. A shorter labor period, which indicates that labor is progressing, may be attributable to the effective effect of virtual reality (VR) intervention as a distraction strategy. This may be because VR plays a significant role in assisting in the reduction of dystopia by having a positive impact on contractions, which are necessary to enhance cervical dilatation and fetal descent and are not negatively impacted by some pharmaceutical interventions (slow labor progress). Frey et al. (2019) also demonstrated that wearing 360-degree eyewear

while viewing virtual reality video during the first stage of labor in shortening delivery length probably. Opposite to this, the results of our study in contrast to *Amiri, et al., (2019),* who clarified that there was no statistically significant difference in total length and duration of labor.

Concerning pregnant women's satisfaction with the VR app is described, The results showed that most women were content with the VR application (Total mean score percent = 83%). the tiny percentages of women (8.0% and 9.6%, respectively) who were unhappy with and extremely satisfied with VR apps An individual's assessment of the quality of healthcare services and providers is satisfaction. These assessments take into account the person's personal preferences, expectations, and the actual quality of the care received. Improved satisfaction has been identified as a goal for improvement in health care. Satisfaction is one of the most often reported outcome metrics for quality of care. Healthcare professionals now place a greater emphasis on the satisfaction of women with maternity services, particularly concerning labor and delivery care, and administrators. Women's satisfaction with childbirth is partly related to the health and well-being of the mother and her baby (Sawyer, et al., 2013).

The findings of the current study were in agreement with Wong, et al., (2019) research on "Patient-reported outcomes on the use of virtual reality for pain management in labor," which discovered that all laboring women recommended VR intervention. Moreover, Cowles, et al. (2019), who conducted a study titled "Virtual reality may lower discomfort during labor," found that the results of the present study were consistent with their findings. According to the findings, 77% of women said they would like to utilize virtual reality (VR) once more if they had another child.

Additionally, David, et al. (2019) who studied "Virtual reality analgesia in labor: The vrail pilot study- a preliminary randomized controlled trial suggesting benefit of immersive virtual reality analgesia in unmedicated laboring women, Anesthesia & Analgesia," supported these findings. The results showed that 82% reported completely and very much enjoying VR use during labor and 70% reported completely and very interested in new VR development specifically. The results of another study by Sahin and Basak (2020), "The effects of intraoperative progressive muscle relaxation and virtual reality application on anxiety, vital signs, and satisfaction," revealed a significant difference between the VR and control groups (p <0.05).

Additionally, the findings of our study are consistent with Smith, et al., (2020) research, "A Randomized Controlled Trial to Assess the Feasibility of Using Virtual Reality to Facilitate Analgesia During External Cephalic Version," which showed that 88% of women who received VR said they would recommend it to a friend who was having (ECV) External cephalic version and 80% of women who received it said they would use it again. In addition, the findings of this study were in agreement with those of Sridhar et al., (2020), who investigated "Non-pharmacological anxiety reduction with immersive virtual reality for first-trimester dilation and curettage." The latter study's findings showed that participants generally had positive experiences with VR intervention. Due to their non-invasive

nature, cost-effective and no severe side effects non-pharmacologic therapies have gained popularity, which may account for these positive results.

Conclusion

Based on the results of the present study it could be concluded the virtual reality application has a positive effect on decreasing the delivery stages length and enhancing maternal satisfaction among the studied pregnant women. Moreover, there was a shorter duration of delivery stages length among virtual reality group women with a highly statistically significant difference between both virtual reality and control groups. In addition, there were obvious positive effects of VR intervention on maternal satisfaction and the majority of women showed maternal satisfaction toward VR application.

Recommendation

In light of the current study findings, the following recommendations can be suggested:

- Virtual reality could be applied as an alternative non-pharmacological therapy in maternity hospitals for a significant effect on delivery stages length and maternal satisfaction.
- More studies are needed to replicate the study on a larger sample for generalizing the findings to confirm the benefit of VR and analyze how to better applying.
- Future research should test different visualization and levels of user interaction. As playing games in addition to nature/meditation scenes.

References

Amiri, P., Mighafourvand, M., Esmaeilpour, K., Kamalifard, M. &Lvanbagha, R., (2019): The effect of distraction techniques on pain and stress during labor, 19:534, p; 1-9.Available at: https://doi.org/s12884-019-2683-y.

Cowles, S., Norton, T., Quiner, T., Hannaford, K. & Foley, M. (2019 a): Virtual reality may decrease pain during labor, American Journal of Obstetrics & Gynecology, p; 527-528.

David, F., Melissa, B., Carrie, B., Kane, L., Afton, h., Ruth, C., Katherine, B. & Sam, S. (2019): Virtual reality analgesia in labor: The vrail pilot study- a preliminary randomized controlled trial suggesting benefit of immersive virtual reality analgesia in unmedicated laboring women, Anesthesia & Analgesia, 128(6), Available at https:// journals. low. com/ anesthesia-analgesia/Fulltext/2019/06000. Accessed on December 12, 2019, 7 AM.

Dutta, A. & Groves, A. (2019): Management of labor, NHS, University Hospitals Group, 09079/ 5.1.

Ebrahimian, A. &Bilandi, R., (2020): Comparisons of the effects of watching virtual reality videos and chewing gum on the length of delivery stages and maternal childbirth satisfaction, Iranian Journal of Medical Sciences, Available at:doi:10.30476/ijms.2019.82782.1119.

Fathi L, Amraei K. (2019): Effects of Phoenix dactyl-ifera Syrup Consumption on the Severity of Labor Pain and Length of the Active Phase of Labor in Nulliparous Women. Iran Journal of Nursing;31:18-27. doi: 10.29252/ ijn.31.116.18. Persian.

Frey DP, Bauer ME, Bell CL, Low LK, Has- sett AL, Cassidy RB. (2019): Virtual Reality Analgesia in Labor: The VRAIL Pilot Study- A Preliminary Randomized Controlled Trial Suggesting Benefit of Immersive Virtual Reality Analgesia in Unmedicated Laboring Women. Anesth Analg;128:e93- e6. doi: 10.1213/ANE.0000000000003649. PubMed PMID: 31094789.

Ganji Z, Shirvani MA, Rezaei-Abhari F, Danesh M. (2017): The effect of intermittent local heat and cold on labor pain and childbirth outcome. Iran J Nurs Midwifery Res;18:298-303.

Gur, E. &Apay, S., (2020): The effect of cognitive behavioral techniques using virtual reality on birth pain, Midwifery, 91. Available at: https:// doi. org/ 10. 1016/j.midw.2020.102856. Accessed on November 1, 2019, 4 PM. 1016/ j.jopan.2019.11.002. Accessed on November 15, 2019, 8 PM.

Indovina P, Barone D, Gallo L, Chirico A, De Pietro G, Giordano A. (2018): Virtual Real- ity as a Distraction Intervention to Relieve Pain and Distress During Medical Proce- dures: A Comprehensive Literature Review. Clin J Pain;34:858-77. doi: 10.1097/ AJP.0000000000000599. PubMed PMID: 29485536.

Jha P, Larsson M, Christensson K, Skoog Svanberg A. (2017): Satisfaction with childbirth services provided in public health facilities: results from a cross-sectional survey among postnatal women in Chhattisgarh, India. Glob Health Action;10:1386932. doi: 10.1080/16549716.2017.1386932. PubMed PMID: 29087240; PubMed Central PMCID: PMCPMC5678347.

Kordi M, Bakhshi M, Masoudi S, Esmaily H. (2018): Effect of Prenatal Psychological Training on Satisfaction with Childbirth and Maternal Role Competence in Primiparous Women. Journal of Mazandaran University of Medical Sciences;28:98-108. Persian.

London. M, Galan. H, Jauniaux. E, Driscoll. D, Berghella. V, Grobman. W, Kilpatrick. S & Cahill. A, (2021): Gabbe's obstetrics Normal and problem pregnancies, 8th, ELSEVIER, Canada, p; 203.

Mansouri A, Vahed AS, Shahdadi H, Mehr SD, Arbabisarjou A. (2018): A comparative study on the effect of sugarless chewing gum with sugarless candy on xerostomia in patients undergoing hemodialysis. Bali Med J;7:146-51. doi: 10.15562/bmj.v7i1.844.

Moghimi Hanjani S, Mehdizadeh Tourzani Z, Zeighami Mohammadi S, Nasrollahi S, Haghighi Khoshkho N, Tajvidi M. (2018): The Effect of Local Heat Therapy Method on Pain, Child- birth's Outcomes, and Rate of Satisfaction in Primiparous Women: Randomize Clinical Trial. Qom University of Medical Sciences Journal;12:35-43. doi: 10.29252/ qums.12.5.35.

Pratiwi I, Husin F, Ganiem AR, Susiarno H, Arifin A, Wirakusuma F. (2017): The effect of virtual reality on pain in primiparity women. International Journal of Nursing and Health Science;4:46-50.

Rezai, MS., Goudarzian, AH., Koulaee, AJ. &Nesami, MB. (2016): The Effect of Distraction techniques on the Pain of Venipuncture in Children, J Pediatr Rev, 5(1), p; 2.

Sahin, G. &Basak, T. (2020): The effects of intraoperative progressive muscle relaxation and virtual reality application on anxiety, vital signs, and

596

satisfaction, Journal of Perianesthesia Nursing, 35(2020), available at https://doi. org/ 10.

Sakala, E.P. (2020): Obstetrics and Gynecology, 1st, Kaplan Medical, New York, p; 1-4.

Sawyer, A., Ayers, S., Abbot, J., Gyte, G., Rabe, H. &Duley, L. (2013): Measures of satisfaction with care during labor and birth, BMC Pregnancy and Childbirth, 13:108, Available at https://www. Biomed central. com/1471-2393/13/108. Accessed on August, 52019, 7 PM.

Sayed W, AbdElAal D, Mohammed HS, Abbas AM, Zahran KM. (2018): Maternal satisfaction with delivery services at a tertiary university hospital in upper Egypt, is it satisfy-ing. Int J Reprod Contracept Obstet Gynecol;7:2547-52. doi: 10.18203/2320-1770. ijrcog20182859.

Sel, G. (2019): Practical Guide to Oral Exams in Obstetrics and Gynecology, Normal Vaginal Labor, Springer Nature SwitzerLand, Turkey, p; 94.

Siddiquee NA. (2016): E-government and transformation of service delivery in develop- ing countries. Transforming Government: People, Process and Policy;10:368- 90. doi: 10.1108/TG-09-2015-0039. Persian.

Smith, V., Warty, R., Kashyap, R., Neil, P., Adriaans, C., Nair, A., Krishan, S., Costa, F., Vollenhoven, B. & Wallace, E. (2020): A randomized controlled trial to assess the feasibility of utilizing virtual reality to facilitate analgesia duringexternal cephalic version, Scientific Reports, 10:3141, available at https:// doi.org/10.1038/s41598-020-60040-3. Accessed on September, 2, 6 PM.

Sridhar, A., Shiliang, Z., Woodson, R. & Kwan, L. (2020): Non-pharmacological anxiety reduction with immersive virtual reality for first-trimester dilation andcurettage, The European Journal of Contraception & Reproductive Healthcare, 25 (6), p; 1-4. Available at: https://doi.org?10.1080?13625187.2020.1 836146. Accessed on January 17, 2020, 8PM.

Tacgin, Z. (2020): Virtual and Augmented Reality, 1st, Cambridge Scholars Publishing, Newcastle, p; 16.

Thomas L. (2020): Control groups in scientific research. Available at: https:// www. scribbr.com/methodology/control- group/. Accessed on August 1, 2019, 4PM.

Wong, Spring, M., Gregory & Kimberly, D. (2019): Patient-reported outcomes on the use of virtual reality for pain management in labor, The American College of Obstetricians and Gynecologists, Available at https:// journals. www. com/ greenjournal/Abstract/2019/05001.

Yokoyama I, Sarai T, Asai T, Kitou N, Nozaki H, Kondo Y. (2019): Virtual reality and augmented reality applications and simulation in vascular access management with three-dimensional visualization. J Vasc Access; 20:65-70. doi: 10.1177/1129729818776904. PubMed PMID: 31032726.

Zare S, Zandvakili F, Soofizade N, Farhadifar F, Sadrinezhad A. (2017): Evaluation of the causes and maternal and fetal complications in pro- longed pregnancy compared with term pregnancy in Sanandaj Besat hospital during 2013-2014. The Iranian Journal of Obstetrics, Gynecology, and Infertility; 20:29-34. Persian.