Effect of Virtual Reality Application on Pain and Anxiety among Primiparous Women with Episiotomy

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Abstract

Background: One of the most popular procedures for facilitating birth and preventing problems is episiotomy. During the postpartum period, episiotomy-related pain and anxiety interfere with women's normal activities. Virtual reality is a novel and cutting-edge technology that is both safe and effective in lowering pain and anxiety after episiotomy. **The aim** was to evaluate the effect of virtual reality application on pain and anxiety among primiparous women with episiotomy. **Design:** A quasi-experimental design was used to achieve the aim of this study. **Setting**: The study conducted at General Qena Hospital and South-Vally University Hospital's postpartum department. **Sample:** A purposive sample included 200 primipara women enrolled and was equally divided into two groups (the control group was 100 primipara and the study group was 100 primipara). **Tools:** There are four main tools; (I) interviewing questionnaire included two parts (1) demographic data and (2) obstetrics history), (II) Numerical Analog Scale (NAS), (III) Anxiety Rating Scale, and (IV) Modified maternal satisfaction questionnaire. **Results**: According to the current study, the study results revealed that there were no statistically significant differences in maternal characteristics between the two groups. Regarding pain intensity, postpartum mothers in the study group had a lower mean score than those in the control group, with a statistically significant difference between the two groups on the eighth and fourteenth days after the intervention. The majority of primiparous women undergoing episiotomy reported being satisfied with the virtual reality application, and there was a highly statistically significant difference in anxiety levels. **Conclusion:** Virtual reality had a positive effect on reducing pain and anxiety levels among primiparous women with episiotomy**. Recommendations:** Virtual reality is recommended and should be included as an alternative non-pharmacological therapy for reducing pain and anxiety among primiparous women with episiotomy during the postnatal period.

Keywords: Anxiety, Pain and primiparous, Virtual reality, Women with episiotomy

Introduction:

Episiotomy can be defined as the surgery in which the vaginal orifice is enlarged through an incision of the perineum. This surgery is done either during the second stage of labor or just before the delivery and this helps for a safe and easy labor. This surgery is commonly done for almost all women at their first delivery. Episiotomy involves some types, such as medio-lateral, median, lateral, and J-shaped episiotomy. Of these, A medio-lateral episiotomy is the most frequent (**Durmaz, &Bugdaycı, 2020**).

Episiotomy is often recommended by the World Health Organization (WHO) for some selected indications. The reason for this is that episiotomy prevents more extensive childbirth injury. In terms of surgical repair, it is worth noting that a single cut edge is easier to surgical repair than it is for an extensive jagged edge or multiple jagged edges. It is the only surgical procedure in obstetrics that is carried out without the patient's agreement. Remarkable recurrent complications of episiotomies are accidental extension into the anal sphincter or rectum, excessive narrowing of the introitus, vaginal prolapse, and recto-vaginal fistula. Other less frequent

complications are pain and edema, increased blood loss, hematoma and infection and also psychological trauma as well as dyspareunia may sometimes occur (**Jacob, 2019**).

Pain is one of the side effects of episiotomy, and pain relief requested by a woman is considered a medical indication for the use of pain relief methods. Nurses and midwives are responsible for responding to the need for pain relief (if needed). Poor management of pain decreases the efficacy of the therapeutic intervention **(Li et al., 2018**). Nowadays, the interest in using nonpharmacologic methods is increased due to the non-invasive nature and no severe side effects. The use of VR, as a non-invasive and analgesic method without drug addiction and minimum side effects, is used in clinics (**Gold et al., 2019**).

Any women endure a considerable amount of anxiety during their labor. Some of them have described this process as frightening and stressful, even after using opioids **(Jantjes et al., 2017**). Stress can cause difficulties in the process of childbirth (**Hernandez-Martínez et al., 2017**). After examining the childbirth of 205 women, discovered that low levels of stress increase the rate of natural childbirth (**Ryding et al. 2017**). The bad experience of previous childbirth is one of the reasons which can increase fear and anxiety. Anxiety is one of the reasons known to be the cause of 10–15% of depression cases after childbirth (**Toohey, 2019**). **Hoban and Liamputtong**, (**2017)** emphasized that nurse should be alert to the patterns of care and support before and after childbirth to prevent post-childbirth depression. Anxiety affects women's quality of life and even the future of the baby. **Wiktor et al., (2017**) recommend the post-childbirth evaluation, especially for the case of the primiparous women and the women more than 20 years of age.

There are many interventions that nurses can implement to help reduce anxiety and promote comfort. The methods used for the management of episiotomy pain are divided into two groups: pharmacological and non–pharmacological therapies. Pharmacological therapies (local anesthesia, spinal anesthesia, epidural anesthesia, etc) are offered to prevent or decrease episiotomy pain **(Noe, 2020).**

On the other hand, non-pharmacological therapies help to ensure that the labor safely takes place and facilitates a positive outcome. Non-pharmacological therapies are an option to replace analgesia during labor andto support the woman in dealing with her pain complaints including birthing balls, reflexology, heat and cold therapy, transcutaneous electrical nerve stimulation (TENS), aromatherapy, hydrotherapy, and Virtual Reality (VR). Non – pharmacological therapies not only relieve pain but also relieve fear, and anxiety, improve episiotomy pain progress, minimize drug requirements, applicable, cheap and safe **(McLaughlin & Lyons, 2020).**

Virtual Reality (VR) is a non-pharmacological therapy and a distraction intervention to provide a pleasant environment by using a computer-simulated technique that provides a visual image with accompanying sounds by wearing a headset connected to a computer or a smartphone. This technology allays pain and anxiety by allowing individuals to hear, feel, and communicate with stimuli of the virtual environment as the real world **(Linowes, 2020).**

According to the neuromatrix theory of pain, cognitive, sensory, and affective inputs as well as factors influencing those, such as attention can change pain perception and ultimately a person's response to pain. Accordingly, by engaging the cognitive resources of a person in a task by watching or playing something through VR, offering them sensory stimulation visual and auditory, or offering them positive affective experiences by enjoyment or success, limited capacity remains for the person to process or attend to pain **(Ahmadpour, et al., 2020).**

Pain relief is one of the amazing benefits of VR in medicine. VR is safe, enjoyable, and effective, simplifies complex problems and situations, creates interest, and minimizes anxiety. As a consequence, VR technology can improve patients' quality of life and satisfaction with care **(Li, et al., 2017).**

Nurses have a critical and vital role in assessing the women's perception of pain by

documenting and evaluating the pain and providing options for pain control by giving information about pain relief measures used by the hospital. In addition to, evaluating the maternal and fetal response to treatment as side effects, women's satisfaction with that treatment, and modifying the plan of care when needed. Effective and competent nurses must be knowledgeable and understand t h e implications of treatment and usually try to diminish distress related to pain and respond quickly to reports of pain and will believe patients' reports of pain **(Murray & Huelsmann, 2020).**

Significance of the study

Despite not being supported by evidence in daily practice, episiotomy is still one of the most frequent procedures in obstetrics. Statistics done by (**WHO, 2020**) have shown that roughly 30-90% of women suffering from vaginal delivery had an episiotomy. (**WHO, 2020**) also reports that around 23% of women have health problems in the first month after delivery. This problem occurs because of episiotomy, i.e. the risk of perineal infections with episiotomy reaches 20%. Perineal pain is attributed to overstretching, edema, and muscle spasm that entails difficulties to practice motherhood daily activities and also negatively affects women's sleep. These complications result in physical, psychological, and emotional problems which collectively negatively affect women's overall health.

Virtual Reality is a non-pharmacological therapy and one of the distraction techniques that replaces the real world by immersing users in a computer-generated virtual world. VR is utilizing five senses to focus the patient's attention on other stimuli and hence control pain in a better way. This technique can help in reducing pain, fear, and anxiety andcan also be helpful with any discomfort after labor **(Rezai, et al., 2016)**. VR is cost-effective, safe, and effective in pain and anxiety control, can be used as a self-management tool for pain relief, and is affordable **(Tacgin, 2020).**

Operational definition of virtual reality:

Virtual reality 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.

Aim of the study

The present study aimed to evaluate the effect of virtual reality application on pain and anxiety levels among primiparous women with episiotomy.

Research Hypotheses:

- Primiparous women with episiotomy who apply virtual reality would have alleviated pain more than those who don't.
- Primiparous women with episiotomy who apply virtual reality would have alleviated anxiety more than those who don't.

Research design:

A quasi-experimental design was used to achieve the aim of this study. (Two-Groups, control, and study). A quasi-experiment is an observational interventional analysis used without random assignment to estimate the causal effect of an intervention on the target population. Quasi-experimental study shares similarities with conventional experimental design or randomized controlled trials, but the aspect of random assignment to treatment or control is missing **(Dinardo, 2008; Iowa State University of Science and Technology, 2020).** In a scientific study, Control groups are essential to experimental design. When researchers are interested in the impact of a new treatment, they randomly divide their study participants into at least two groups: The study group (also called the experimental group) receives the treatment whose the researcher is interested in. The control group receives either no treatment, a standard treatment whose effect is already known, or a placebo (a fake treatment) **(Thomas, 2020).**

Setting:

The study conducted at General Qena Hospital and South-Vally University Hospital's postpartum department. This setting was chosen because it is the main hospital providing care for women with different social backgrounds and high-risk women. Also, it's a

clinical training setting for nursing students in the Faculty of Nursing. This hospital provides free and economical services to all patients. The hospital receives large numbers of women each month who seek care for follow-up during pregnancy from different areas (urban & rural areas).

Sample type:

A purposive sample that included 200 postpartum women who delivered by normal vaginal with episiotomy was enrolled and was equally divided into two groups (the control group was 100 primipara and the study group was 100 primipara). The sample was selected according to the following inclusion criteria; age not exceeding 35 years, primiparous, singleton pregnancy, underwent mediolateral episiotomy, at least can read and write, free from any high-risk condition in the prenatal period, accept the VR intervention, and willing to participate in the study. While the exclusion criteria were as follows, gestational age less than 37 or more than 42 weeks; mothers with BMI ≥30, having any complications during previous deliveries, who have 3º or 4º perineal tear, delivered with the instrument, having immediate postnatal complications. The odd number of admitted mothers in the delivery list was taken as the study group, while the even number was taken as the control group.

Sample size:

The number of study subjects calculated by the followingformula. But, for the accuracy of statistical measurements, the sample size willbe 200. A total of 200 primiparous women were randomly divided into two groups (control group =100 women who received routine care and study group =100 women who used virtual reality technology).

- n= sample. n =N
- N= population.
- e= margin error (0.05).

$1+N\ (e)^2$

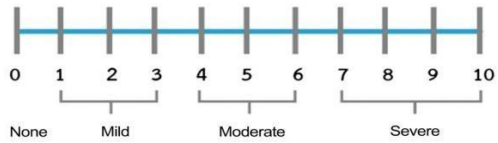
Tools of data collection:

Four tools were used for collecting data.

Tool I- Interviewing questionnaire: It consisted of two parts:

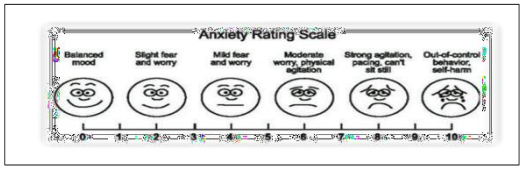
- **Part (1)** demographic data of primipara women such as (age, residence, level of education, occupation).
- **Part (2)** Obstetrical history of women such as external length of episiotomy (by cm.), and weight of newborn (in kg.).

Tool II- Numerical Analog Scale (NAS): Developed by **Mc Caffery, (1999**), it was used to measure the intensity of perineal pain, rated from (0-10 points) with two end-points representing «No pain» and «Unbearable pain». The test-retest reliability coefficient of the NAS has been demonstrated as r =0.62.



Tool III- Anxiety Rating Scale: This was developed by **(Bloch, 2009)** to assess the level of anxiety experienced by the woman during labor. It is a straight line, the ends of which aredefined as the extreme limits of the sensation to be measured from 0 (balanced mood) to 10 (out of control). The anxiety rating scale

scoring was divided into six main parts: the first part graded 0 which indicated balanced mood, the second part from 1-2 reflecting slight fear and worry, the third part from 3-4 indicating mild fear, the fourth part graded 5 indicating moderate fear, the fifth part from 6-7 reflect strong agitation and the six-part from 8-10 indicate out of control behavior.



Tool IV: Modified maternal satisfaction questionnaire:

This was constructed by the researcher after reviewing related literature to assess maternal satisfaction with the usability of virtual reality. It has consisted of 6 questions to obtain the outcome ofthe questionnaire such as the application's ease of use; the application has sparked interest, the degree to which the application is immersive, the VR headset's comfort, discomfort level when wearing a

head-mounted display (HMD), how likely were they to tell other women about the application? Each statement scored as the following: (3) if the response was "Highly satisfied", (2) if it was "Satisfied", and (1) if it was "unsatisfied".

Tools validity:

The tools of data collection were reviewed by a panel of five experts including three from obstetrics and gynecological nursing professors and two from obstetrics and gynecological medicine to test the content validity, clarity of sentences, and the appropriateness of the content. No modifications were carried out accordingto the panel's judgment.

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 showed by the moderate to the high reliability of each tool. The test-retest reliability coefficient of the tool I was 0.89, tool II was 0.87, tool III (NAS) has been demonstrated as r =0.62, and tool IV was 0.78.

Pilot study:

The pilot study was carried out. It involved 10% of the total sample (20 primiparous women) to assess the feasibility of the study, accessibility of the sample, and clarity of the tools, as well as determine the time needed to answer the questions. Postnatal mothers involved in the pilot were excluded from the study.

Ethical considerations:

The aim of the study was explained 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 needed. The study was not having any physical, social, or psychological risks to the participant. Confidentiality was ensured throughout the study process and the women were assured that all data was used only for research purposes. Each study subject was informed about time throughout the study.

Field of work:

Upon obtaining official permission from the director of South-Vally University Hospital, 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.

I. Preparatory Phase:

The preparatory phase was the first phase of the research; the researchers carried out through review of local and international related literature about the various aspects of the research problem. This helped the researchers to be aware of the magnitude and seriousness of the problem, and guide the researchers to prepare the required data collection tools. Tools were distributed to five experts in the field, three from obstetrics and gynecological nursing professors and two from obstetrics and gynecological medicine, the aim was to test their appropriateness, comprehensiveness, clarity, importance, and applicability. The result of the jury was done. During this phase, an official approval to conduct the research was obtained by submitting an official letter was obtained from the Dean of Faculty of Nursing at South-Vally University to the director of South-Vally University Hospital to obtain their agreement to conduct the research after explaining its purpose.

II. Assessment Phase:

This phase encompassed interviewing the postnatal mothers in Postpartum Department three days per week starting from 9.00 a.m. to 1.00 p.m. (in both the study and control group) to collect baseline data. The researcher interviewed 2 – 3 women/day until the predetermined sample size attain from women who met the inclusion criteria mentioned firstly, at the beginning of the interview the researchers greeted each postnatal mother, introduced themselves, explained the purpose and duration of the study. Postnatal mothers who met the inclusion criteria were identified and oral informed consent was taken to participate in the study. The data obtained during this phase constituted the baseline for further comparison to explore the usability of

virtual reality for relieving pain and anxiety for postnatal mothers after episiotomy. In this phase, all postnatal mothers in both groups were examined firstly at the Postnatal Department within two hours after delivery by the researchers to measure the episiotomy incision length and collect the baseline data related to episiotomy pain and postnatal mothers' anxiety level before the intervention by using NAS and Anxiety Rating Scale. These assessments took about 20 minutes for each postnatal mother.

III. Implementation Phase:

The sample was divided into two groups, the control group (group A constituted 100 postnatal mothers) and the study group (group B constituted 100 postnatal mothers). The study was started by the control group and followed by the study group. Data were collected over 9 months from the beginning of February 2021 to the end of October 2021 at the Postnatal Department in the obstetrics and gynecological department at South-Vally University Hospital.

Control group:

- Routine care was given to the control group by the hospital staff.
- Collecting demographic data and obstetrical history using (the 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.
- Pain and anxiety were assessed after episiotomy
- The pain and anxiety were assessed twice (initial assessment and repeated assessment).

- **Initial assessment**: immediately after episiotomy, level of pain assessed by using (tool II: NRS) and level of anxiety assessed by using (tool III: Anxiety Rating Scale). The initial assessment took around ten minutes to be completed for each woman.
- **Repeated assessment:** after two hours of episiotomy, pain and anxiety were assessed. The repeated assessment took around ten minutes to be completed for each woman.

Study group:

- Routine care was given to the study group by the hospital staff in addition to VR intervention.
- Assessing demographic data and obstetrical history using (the tool I: structured interviewing questionnaire). The researcher asked questions in Arabic and recorded the answers in the schedule.
- Pain and anxiety were assessed after episiotomy; this step took about ten minutes.
- The pain and anxiety were assessed twice: initial assessment (pre-intervention) and repeated assessment (post-intervention).

- **Initial assessment (pre-intervention):** immediately after episiotomy, level of pain assessed by using (tool II: NRS) and level of anxiety assessed by using (tool III: Anxiety Rating Scale). The initial assessment took around ten minutes to be completed for each woman.
- **Repeated assessment (post-intervention):** Each intervention was given for one hour to relieve pain and anxiety. After VR intervention pain and anxiety were assessed again. For this study the researchers used VR distraction devices which allowed users to glide through 360 degrees of video and provides a complete replacement that allows the person to interact with VR as if in the real world by using mobile VR in which the phone's display is used to show the twin stereoscopic views **(Pratwi, et al, 2017).** The repeated assessment took around ten minutes to be completed for each woman.

- Finally, the women in the study group were assessed for their satisfaction (Tool IV) with the usability of VR.
- The VR glasses had been sterilized with alcohol while using it between women to prevent cross of infection.
- Pain intensity by using NAS and the anxiety rating scale was assessed immediately and recording the results

IV. Evaluation Phase:

The researchers met the postnatal mothers (study& control) after episiotomy to assess the pain intensity by using NAS and the Anxiety Rating Scale and recording the results. Both groups were evaluated twice after episiotomy (for the control group: initial assessment and repeated assessment within 60 minutes) and (for the study group: immediately and after one hour of intervention) as mentioned and explained previously in the implementation phase.

Administrative design:

The necessary official permissions for data collection were obtained by submitting an official letter from the dean of faculty of nursing to the administrator of the study settings. The title and objectives of the study were illustrated as well as the main data item to be covered.

Statistical design:

Data entry and statistical analysis were done using the Statistical Package for Social Science (SPSS) version 20.0 statistical software package. Results were presented as frequencies and percentages. Independent – Samples t-Test analysis to test the statistical significance of some variables and to test the effectiveness of the intervention between the two groups (t-test, chi-square). Statistical significance was considered at p-value < 0.05. In addition, a highly significant level value was considered when p<0.01.

Limitation of the study:

Because VR technology is a new modality of medicine and extremely new to relieving pain and anxiety after episiotomy, especially in the Middle East, there was some difficulty to persuade women to accept participation in the study.

Results:

Results of the study revealed that the mean age of the sample was **21.05±4.14** for the study group and **21.57±4.60** for the control group, and (59% and 63%) respectively in the control group and the study group. As well, about one-third of the study and control groups had a certificate of secondary school (44% &48%respectively). Regarding occupation, most of the participants in both groups were housewives (89% and 80 %respectively). The two groups were homogeneous in their characteristics (**table 1**). Generally, there was no statistically significant difference between the study and control groups regarding demographic characteristics.

Table (2) there were no statistically significant differences between the two groups in terms of neonate weight and episiotomy incision length, according to the findings.

Table (3): illustrated mean pain scores among study and control groups after episiotomy. The result indicated that there was no statistically significant difference between the study and control groups pre-application. There was a reduction in pain scores after episiotomy (immediately after application and after one hour) with a highly statistically significant difference between the study and control groups (P <0.001).

Figure (1) showed that (33%) of women in the study group had severe pain after episiotomy compared to (70%) in the control group one hour after VR application.

Table (4): illustrated mean anxiety scores among study and control groups after episiotomy. The result indicated that there was no statistically significant difference between the study and control groups pre-application. There was a reduction in anxiety scores after episiotomy immediately after application and post one hour of VR application with a highly statistically significant difference between the study and control groups (P<0.001).

This figure (2) shows that (10%) of women in the study group had severe anxiety after episiotomy compared with (30%) of control group women one hour after VR application.

Table (5) clarified the postnatal women's satisfaction with VR application. Results showed that the majority of them were satisfied with the VR application (83%). A few percentages of them were non–satisfied and highly satisfied with VR application (8.0% and 9.0%), respectively.

Table (1): Distribution of studied sample according to their demographic characteristics (n= 200)

Characteristics	Control groupn=100		Study groupn=100		Chi square test	P-value
	No	%	No	%		
Age (in years)					.874	>0.05
Mean ±SD	**21.57±4.60**		**21.05±4.14**			
Residence						
Urba n- Rural	41 59	41.0 59.0	37 63	37.0 63.0	.667	>0.05
Educational qualification						
Pre-primary education Primary education Secondary school University education	10 20 48 22	10.0 20.0 48.0 22.0	10 25 44 21	10.0 25.0 44.0 21.0	1.24	>0.05
Occupational status						
Housewife Working	89 11	89.0 11.0	80 20	80.0 20.0	1.76	>0.05

Table (2): Distribution of studied sample according to their obstetrics history (n= 200)

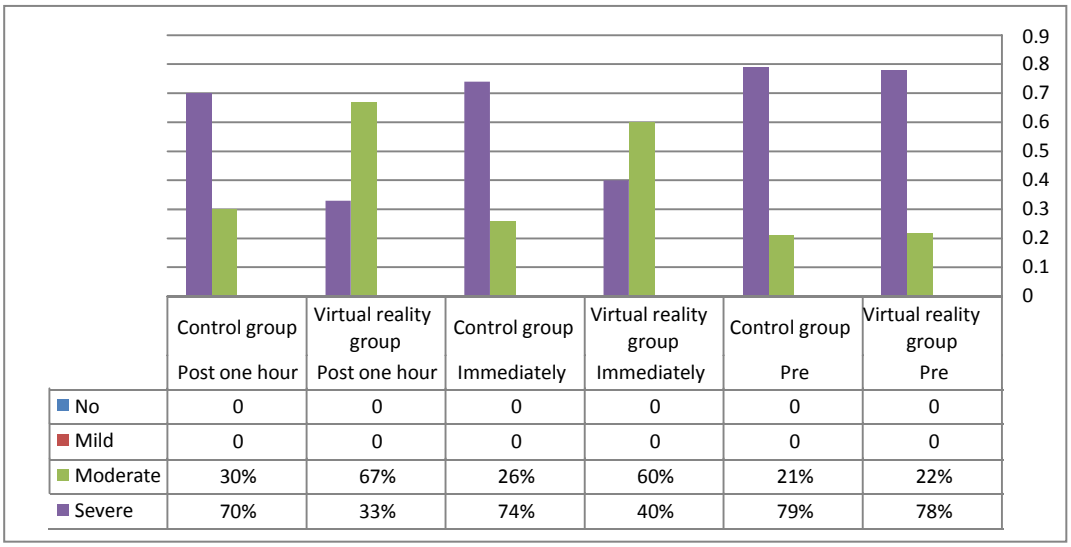
Obstetrics history	ntrol groupn=100		groupn=100		Chi-squaretest	P-value
	No	%	No	%		
Weight(kg) of newborn, M±SD	3138±300.24		3222.43±420.83		0.505	>0.05
Length of episiotomy(cm)	3.79±0.82		3.76±0.84		1.23	>0.05

A Statistical significant $p \leq 0.05$A Highly Statistical significant $p \leq 0.001$

Table (3): Mean labor pain scores among studied sample after episiotomy post virtual reality application (n=200)

Episiotomy pain assessment	ontrol group n=100	Study group n=100	Independentt	-test
	Mean ±SD	Mean ±SD		P-value
Level of pain after episiotomy.				
Pre using VR	5.65±1.14	5.68±1.13	-.243	>0.05
Immediately after episiotomy of using VR	5.62±1.16	5.12±1.02	3.85	<0.001**
Post one hour after episiotomy of using VR	5.03±1.08	4.13±1.67	17.68	<0.001**

A Statistical significant $p \leq 0.05$A Highly Statistical significant $p \leq 0.001$



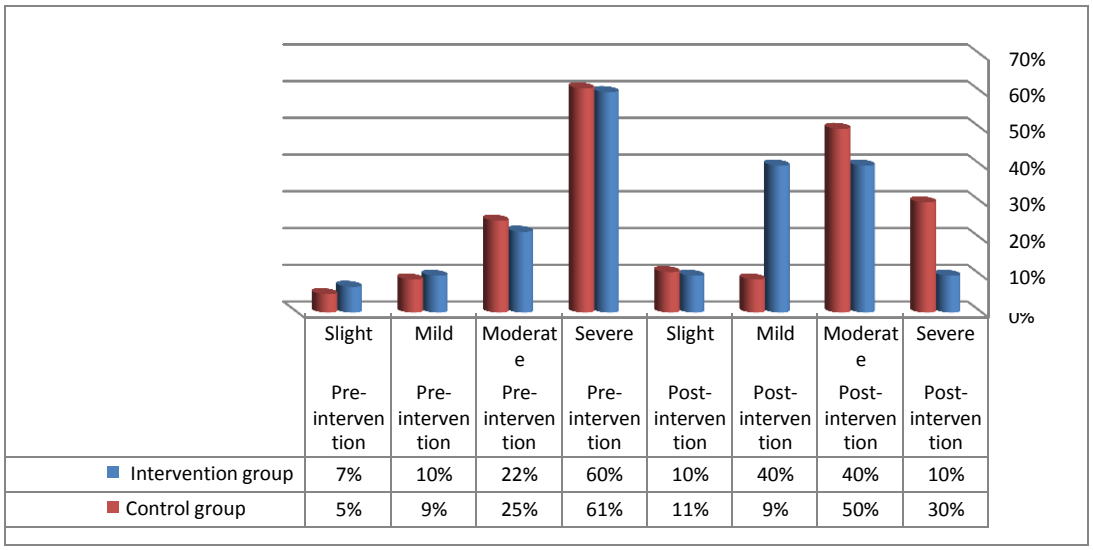
	Control group Post one hour	Virtual reality group Post one hour	Control group Immediately	Virtual reality group Immediately	Control group Pre	Virtual reality group Pre
No	0	0	0	0	0	0
Mild	0	0	0	0	0	0
Moderate	30%	67%	26%	60%	21%	22%
Severe	70%	33%	74%	40%	79%	78%

Figure (1): Level of pain among studied sample after episiotomy (n=200)

Table (4): Mean anxiety scores among studied sample after episiotomy (n=200)

Anxiety assessment	**ntrol group n=100** **Mean ±SD**	**udy group n=100** **Mean ±SD**	**dependentt**	**-test** **P-value**
Level of anxiety after episiotomy.				
Pre using VR	3.69±.93	3.56±.95	1.07	>0.05
Immediately after episiotomy of using VR	3.69±.94	2.97±.89	11.33	<0.001**
Post one hour after episiotomy of using VR	4.46±.78	2.74±.66	15.78	<0.001**

A Statistical significant $p \leq 0.05$A Highly Statistical significant $p \leq 0.001$



	Slight Pre-intervention	Mild Pre-intervention	Moderate Pre-intervention	Severe Pre-intervention	Slight Post-intervention	Mild Post-intervention	Moderate Post-intervention	Severe Post-intervention
Intervention group	7%	10%	22%	60%	10%	40%	40%	10%
Control group	5%	9%	25%	61%	11%	9%	50%	30%

Figure (2): Level of anxiety among studied sample after episiotomy (n=200)

Table (5): Distribution of studied sample in study group according to their satisfaction toward VR application (n=100).

Items	Non – satisfied	Satisfied	Highly satisfied
	%	%	%
The application's ease of use	4.0	80.0	16.0
The application has sparked an interest.	5.0	77.0	18.0
The degree to which the software is immersive	14.0	80.0	6.0
The VR headset's comfort	3.0	91.0	6.0
Discomfort level when wearing a head-mounted display (HMD)	10.0	77.0	13.0
How likely were they to tell other women about the application?	9.0	79.0	12.0
Total mean score	-	-	-
Total mean percent	8.0	83	9.0

Discussion:

Anxiety contributes significantly to episiotomy discomfort and heightens pain perception. Furthermore, this can exacerbate the pain of uterine contractions and have negative consequences like as decreased placental perfusion and uterine muscle vasoconstriction, all of which can result in fetal hypoxia. The main aim of the study was to evaluate the effect of virtual reality application on pain and anxiety among primiparous women with episiotomy. The findings of the present research supported the first hypothesis that postpartum mothers who apply virtual reality had less perineal pain than those who did not. Also, it supported the second hypothesis that postpartum mothers who apply virtual reality had less anxiety than those who did not. VR is a safe and effective non-pharmacological intervention used to control (pain and anxiety), decrease the duration of labor and promote comfort **Gur &Apay, (2020).**

The present study findings showed that the mean age was **21.05±4.14** for the study group and **21.57±4.60** for the control group. Also, the present research results revealed that slightly more than two-fifths of the study sample in both groups had secondary educational levels. The two groups were similar in their characteristics. There was no statistically significant difference between the study and control groups regarding sociodemographic characteristics. There was homogeneity between the two groups regarding sociodemographic characteristics. This could be because the study sample was chosen using purposeful random sampling. This was advantageous to the current study since it ensured homogeneity of the two study populations, generalization of the study outcomes, and avoided the confounding variables' effect.

The current findings are consistent with those of **Pratiw, et al., (2017),** who investigated "The effect of virtual reality on pain in primiparity women," and found that age and education level did not differ substantially ($p > 0.05$) between the intervention and control groups. This could be because the examined sample was primipara and picked using a purposeful sample between the ages of 18 and 35, which is the average marriage age in the studied society culture.

The findings of this study aligned with those of **Ebrahimian &Bilandi, (2020),** who investigated "Comparisons of the effects of watching virtual reality videos and chewing gum on the length of delivery stages and maternal childbirth satisfaction," finding no statistically significant differences between demographic characteristics like education, occupation, and maternal age. Furthermore, **Amiri, et al., (2019)** found no significant differences in sociodemographic factors between the two groups in their study "The influence of distraction tactics on pain and stress during labor."

Furthermore, **Gur & Apay (2020)**, who presented "The effect of cognitive-behavioral approaches employing virtual reality on delivery pain," found no significant variations in demographic characteristics (age, educational level, employment) between the two groups and that the groups are

homogeneous. **Sahin & Basak (2020**), who investigated "The effects of intraoperative progressive muscle relaxation and virtual reality application on anxiety, vital signs, and satisfaction," backed up the findings of this study. In terms of age and education, the findings revealed that there was no significant difference between the groups.

Concerning obstetric history, the current study findings demonstrated that there were no statistically significant variations in obstetric history between the study and control groups ($p>0.05$). In terms of obstetrics history, there was no difference between the two groups. This could be related to the purposive sample's criteria. This was advantageous to the current study since it ensured homogeneity of the two study populations, generalization of the study outcomes, and avoided the confounding variables' effect.

The results of the study came in harmony with **Gur &Apay, (2020)**, who revealed that there were no significant differences in obstetric variables between both groups and groups show homogeneity.

The present research showed that there was a reduction in pain scores after episiotomy (immediately after application and after one hour) with a highly statistically significant difference between the study and controlgroups ($P <0.001$). This may be due to the positive effects of VR applications. This previous result agrees with **Albers and Borders, (2018**), who studied the factors affecting the healing of episiotomy; the results revealed that VR was found to decrease the pain of episiotomy.

There were highly statistically significant differences between both groups regarding mean pain score after intervention ($P= 0.01$ & 0.00 respectively). According to this study result, the postnatal mothers in the study group had a less mean score of perineal pain than in the control group. From the researchers' point of view, this may be due to the VR effectiveness of virtual reality technology intervention which is reflected in pain reduction.

These results concur with two other studies. **Morris et al., (2019)** conducted a study on "Feasibility and potential effect of a low-cost virtual reality system on reducing pain and anxiety" and reported that approximately five samples felt less severe pain during the usage of VR with analgesics conditions than those in standard condition. Similary**, Hoffman, et al., (2018**) who studied" Immersive Virtual Reality for reducing experimental ischemic pain" found that all patients experienced significantly less pain. On the other hand, **Sander et al., (2020)** performed a pilot study on 30 cancer patients and compared the efficacy of VR in puncture cerebrospinal fluid (CSF) in both VR and standard care conditions. The participants reported no significant difference in pain intensity.

Based on the Gate Control Theory of pain and previous experiences; parameters such as culture, stress, and psychological factors have a powerful influence on the perception of pain by a patient, and it effect pain signals perceived by the brain. The intensity of pain signals, depending on the patient's concentration can be interpreted as very painful to mild pain **(Hoffman et al., 2018**).

Recent studies suggest that not only the virtual environment in the path of the nerve pain interpretation makes a difference, but also reduces the perceived pain by decreasing brain activity on pain. Pain severity is another factor that should be considered when using virtual environments. **Morris et al., (2019)** announced that extreme stimulus prevents the effects of VR distraction. In other words; severe pain can obscure the beneficial effects of VR techniques.

As well as, **Wong, et al., (2019**), who studied "Patient-reported outcomes on the use of virtual reality for pain management in labor", found that VR is effective for reducing pain in women in labor. In addition, **Cowles, et al., (2019 a)**, who researched "Virtual reality may decrease pain during labor", showed that the average pain score before VR use, and after VR use the pain score decreased. There was a statistical difference in pain scores. Moreover, **Wong, et al., (2020),** found that there was a significant reduction in pain scores in control and study groups. Also,

Goodier, (2020), revealed that there was a reduction in pain levels in the study group than in the control group and illustrated that there is an average reduction in pain level at the end of VR application.

In addition, the findings of this study were consistent with those of **Amiri, et al., (2019),** who found a significant difference in pain intensity during labor between the intervention and control groups. Furthermore, **Gur & Apay (2020**) found a significant difference in labor pain during the active phase of labor between the intervention and control groups.

The stimulation of the visual brain while engaging other senses may be the reason for the improvement and development in pain scores with VR intervention. The user's processing of nociceptive sensations is altered by virtual reality (**Wong et al., 2020**). The capacity to move the patient into another reality, resulting in a slower response to incoming pain signals, is in addition to the pain-relieving effects of distraction through VR (**Sikka et al., 2018).**

Results of the current study showed that about one-third of the studied women in the study group had severe pain after episiotomy compared to the majority in the control group after VR application. This may be due to the effectiveness of the virtual reality distraction role experienced during the procedure.

These findings supported the present study hypothesis (1) that was "primiparous women who apply virtual reality will have alleviated pain than those who don't".

Findings of this study showed that there was a reduction in anxiety scores after episiotomy immediately after application and post one hour of VR application with a highly statistically significant difference between the study and control groups. These findings are consistent with the findings of **Hoffman et al. (2018); Morris et al. (2019**) and **Gershon et al., (2014)** also, reported a reduction in the anxiety scores during the application of VR.

The results of this study came in harmony with **Amiri, et al., (2019)**, who indicated that there was a significant difference in anxiety and stress during labor between the intervention and control groups. Increasingly, these results of the present study supported by **Wong, et al., (2019),** found that100% of subjects indicate that VR reduces their anxiety.

The findings of this study matched with those of **David, et al., (2019)**, indicating that the VR group had significantly lower anxiety scores than the non-VR group. Furthermore, the findings of this study were similar to those of **Sikka, et al., (2018**), who found a substantial difference between before andpost-intervention groups. Furthermore, our findings were consistent with those of **Sahin& Basak (2020**), who found a statistically significant difference in anxiety between the VR and control groups.

These results are similar to the studies conducted by **van et al., (2017)** and **Sullivan et al., (2018)** reported a significant reduction in children's heartbeats, after using the VR, which is indicative of their anxiety during dental operations reported a significant reduction of anxiety level.

The results of the present study clarified that the majority of women were satisfied with VR applications. The results of the present study are in accordance with **Wong, et al., (2019), who** found that 100%of laboring women recommended VR intervention. Additionally, the results of the present study come in the same line with **Cowles, et al., (2019 a)**: The results showed that 77% of women reported that they would want to use VR again during future labor.

In addition, these findings supported by **David, et al., (2019),** the results revealed that 82% reported completely and very much enjoying VR use during labor and 70% reported completely and very interested in new VR development specifically for childbirth. Also in a study by **Sahin&Basak, (2020)**, the results showed that there was a significant difference between the VR and control group ($p<0.05$).

Furthermore, the findings of this study aligned with those of **Sridhar, et al., (2020**), indicating that the majority of participants had a pleasant experience with the VR intervention. According to the findings of this

study, which matched those of **Ebrahimian &Bilandi (2020**), there was a substantial difference in maternal birthing satisfaction in the intervention group compared to the control group. These satisfaction levels could be attributed to a desire to choose non-pharmacologic therapy due to its non-invasive character and lack of significant adverse effects.

These findings supported the present study hypothesis (2): that was" primiparous women who apply virtual reality will have alleviated anxietythan those who don't".

Conclusion:

Based on the results of the present study it could be concluded: Virtual reality had a positive effect on reducing pain and anxiety levels among primiparous women with episiotomy**.**

Recommendations:

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

- Virtual reality is recommended and should be included as an alternative non-pharmacological therapy for reducing pain and anxiety among primiparous women with episiotomy during the postnatal period.
- 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 be done to compare VR with other distraction methods such as playing games in addition to nature/meditation.

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