The Effect of Virtual Reality Glasses on Vital Signs and State Anxiety Level in Cancer Patients Receiving Chemotherapy for the First Time: A Semi-Experimental Study*

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Abstract

Aim: This study was conducted as a non-randomized control group experimental study to determine the effect of virtual reality glasses on vital signs and state anxiety levels in cancer patients.

Method: The sample of the study consisted of 30 patients who were assigned to the intervention and control groups by the stratified sampling method. After the chemotherapy infusion was started, the intervention group was provided with relaxing 3D videos of their choice. Both groups were re-administered the situational anxiety scale with the measurement of vital signs at the end of the chemotherapy infusion.

Results: The mean score of the post-chemotherapy state anxiety scale in the intervention group was 30.60±8.20, while in the control group it was 39.70±8.82, and this difference was statistically significantly higher (p <0.05). Although there was no statistical significance in the saturation values measured before and after chemotherapy in the intervention group, it was determined to be higher after chemotherapy (p>0.05).When the control group was examined, although there was a statistically significant difference in heart rate and saturation values (t=3.962; p=0.000, Z=-2.837; p=0.005) before chemotherapy, it was lower than the values of the intervention group.

Conclusion: As a result, virtual reality glasses had a positive effect on the anxiety levels and vital signs of the patients.

Keywords: Cancer, chemotherapy, nursing, state anxiety level, virtual reality.

İlk Kez Kemoterapi Alan Kanser Hastalarında Sanal Gerçeklik Gözlüklerinin Yaşamsal Bulgular ve Durumluk Kaygı Düzeyi Üzerine Etkisi: Yarı Deneysel Bir Çalışma

Öz

Amaç: Bu çalışma, kanser hastalarında sanal gerçeklik gözlüklerinin yaşam belirtileri ve durumluk kaygı düzeylerine etkisini belirlemek amacıyla randomize olmayan kontrol gruplu deneysel bir çalışma olarak yapılmıştır.

Yöntem: Araştırmanın örneklemini tabakalı örnekleme yöntemiyle müdahale ve kontrol grubuna atanan 30 hasta oluşturmuştur. Kemoterapi infüzyonu başlatıldıktan sonra müdahale grubuna kendi seçecekleri rahatlatıcı 3 boyutlu videolar sunuldu. Kemoterapi infüzyonu sonunda yaşamsal belirtilerin ölçümü ile her iki gruba da durumsal kaygı ölçeği yeniden uygulandı.

Bulgular: Müdahale grubunda kemoterapi sonrası durumluk kaygı ölçeği puanı ortalaması 30,60±8,20, kontrol grubunda ise 39,70±8,82 olup bu fark istatistiksel olarak anlamlı derecede yüksekti (p<0,05). Müdahale grubunda kemoterapi öncesi ve sonrası ölçülen satürasyon değerlerinde istatistiksel olarak

Özgün Araştırma Makalesi (Original Research Article)
Geliş / Received: 02.06.2024 & **Kabul / Accepted:** 07.04.2025
DOI: https://doi.org/10.38079/igusabder.1494555

* This study has been derived from the master's thesis titled "The Effect of Virtual Reality Glasses on Vital Signs and State Anxiety Level in Cancer Patients Receiving Chemotherapy for the First Time: A Semi-Experimental Study", which was accepted in 2021 at Ankara Yildirim Beyazit University Institute of Health Sciences Department of Nursing and prepared by Sebile OZDAG under the consultancy of Assoc. Prof. Bahar INKAYA.

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ETHICAL STATEMENT: The permission of the ethics committee required for the conduct of the research was obtained from the Ethics Committee of Ankara Yıldırım Beyazıt University with the number 2019-438 dated 13.11.2019.

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anlamlı fark bulunmazken, kemoterapi sonrası daha yüksek olduğu belirlendi (p>0.05).Kontrol grubu incelendiğinde kemoterapi öncesi kalp hızı ve satürasyon değerlerinde istatistiksel olarak anlamlı fark olmasına rağmen (t=3.962; p=0.000, Z=-2.837; p=0.005), müdahale grubunun değerlerinden düşüktü.

Sonuç: Sonuç olarak sanal gerçeklik gözlüklerinin hastaların kaygı düzeyleri ve yaşamsal belirtileri üzerinde olumlu etkisi olduğu görüldü.

Anahtar Sözcükler: Kanser, kemoterapi, hemşirelik, durumluk kaygı düzeyi, sanal gerçeklik.

Introduction

Cancer is a significant health problem seen in our country and around the world as a disease with a high mortality and morbidity rate that negatively affects a person's quality of life[1]. When the causes of death due to diseases in our country are examined, according to 2019 data from the Turkish Statistical Institute (TURKSTAT), cancer ranks first as the cause of death after cardiovascular diseases, with a rate of 18.4%[2]. According to the latest global cancer data of Globocan 2020, it is observed that 126,335 people died due to cancer in our country in 2020 alone[3]. Chemotherapy is one of the cornerstones of the treatment of cancer, which is increasingly common. Although chemotherapy is a beneficial treatment for the patient's recovery, it has been reported in the literature that patients experience anxiety before, during or after chemotherapy. People diagnosed with cancer may experience psychological distress in the first place by participating in thoughts such as the difficulty of cancer treatment, the side effects of treatment, the unknowns of the disease, the fear of recurrence even if the disease regresses, and the fear of death[4,5]. With the help of the treatments applied today, patients can no longer be prevented from experiencing intense anxiety and concern, even if they believe more that they can recover. The studies show that cancer patients' anxiety and concern levels are pretty high[6,7]. A study found that virtual reality glasses gave positive results and supported psychological wellbeing in pediatric oncology patients[8]. The negativity experienced in the emotional state leads to a delay in the recovery of the patients, the length of hospitalization is prolonged, and the patient's quality of life is reduced. To reduce these negatives, it is crucial to observe the symptoms of anxiety and depression well and to start treatment in cancer patients[9,10].

In general, pharmacological and non-pharmacological methods are used to treat anxiety. Distraction is a simple and effective method of managing pain and anxiety. One of the methods used as a distraction among non-pharmacological anti-anxiety methods is virtual reality (VR) technology. What makes virtual reality a powerful distraction is the ability to simultaneously engage different senses with synthetic stimuli such as visual images, spatial sounds, and sometimes tactile and olfactory feedback[10,11]. With these multi-modal stimuli, a person becomes visually isolated from the medical environment by focusing on the stimuli he/she likes, and a decrease in negative emotions of the person is observed[11-13]. Various studies have shown that high-quality and interactive VR system technology is more effective in diverting attention[11]. When the analyses using this technology are examined, it is seen that it is used to relieve cancer-related symptoms during chemotherapy infusion, reduce pain and anxiety during wound care and physical therapy, and obtain effective results[14]. In another study conducted with patients with chronic low back pain, VR glasses were found to reduce pain severity[15]. In Turkey, a limited number of studies are reached when the literature review is conducted immersive

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environment provided by VR in the field of medicine. According to the studies conducted, no study has been found in the literature that has previously investigated the effects of VR glasses on the anxiety levels of cancer patients in Turkey. From this point of view, it is thought that nursing practices that support patients to improve their emotional states can be included in the care given and increase therapeutic patient-nurse interactions, and this study was conducted.

This study aimed to determine the effect of VR glasses on vital signs and state anxiety levels in cancer patients receiving chemotherapy for the first time. The study was conducted as an experimental study with a non-randomized control group.

The Hypotheses of the Research

H0-1: VR glasses do not affect the pulse of cancer patients receiving chemotherapy for the first time.

H1-1: VR glasses affect the pulse of cancer patients receiving chemotherapy for the first time.

HO-2: VR glasses do not affect the blood pressure of cancer patients receiving chemotherapy for the first time.

H1-2: VR glasses affect the blood pressure of cancer patients receiving chemotherapy for the first time.

H0-3: VR glasses do not affect the oxygen saturation levels of cancer patients receiving chemotherapy for the first time.

H:1-3: VR glasses affect the oxygen saturation levels of cancer patients receiving chemotherapy for the first time.

H0-4: VR glasses do not affect or reduce the state anxiety levels of cancer patients receiving chemotherapy for the first time.

H1-4: VR glasses reduce the state anxiety levels of cancer patients receiving chemotherapy for the first time.

Material and Methods

Place and Characteristics of the Research

The research was conducted in an oncology hospital in Ankara with patients receiving chemotherapy for the first time in a day treatment unit and a medical oncology service. Chemotherapy is administered in four sessions: 08.00 - 09.30 in the morning and 13.00-15.30 in the afternoon. It was carried out after removing the patient's relatives from the room to allow the patient to answer the questions more easily during the research and to prevent the study from being affected by external factors. In this process, the patient has been provided to fill out the forms himself by helping those who want to get help.

The Population and Sample of the Research

According to the information received from the hospital where the research was conducted, the number of patients admitted to the hospital to receive the chemotherapy course for the first time in 2019 was 1400 people; the information was obtained from the records. In the sampling calculation, the minimum number of patients to be recruited

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per group was 26, with the G Power 3.1 package program with an effect size of 0.2 and a power of 80% (for all variables).

As a result of the power analysis made with the data obtained from the study;

Effect size f=0.5434490

The effect size obtained from the study, 5% margin of error and the power of the study for 60 samples (n1:30-n2:30) were found to be 100% (Posthoc performed using state anxiety score).

The population of the study consisted of adult patients who applied to the medical oncology service for the first time to receive a course of chemotherapy located at the day treatment unit of an oncology hospital in Ankara between 27/01/-01/06/2020 with the diagnosis of I-II-III stage cancer. The study sample consisted of a total of 63 patients, including 31 patients for the intervention group who were willing to participate in the study and met the criteria for participation in the study and 32 patients for the control group. One patient in the intervention group and two patients in the control group were excluded from the study because their general condition worsened. Patients included in the study were those who were older than 18, had disease stages I-II-III, knew the diagnosis, did not receive radiotherapy and received chemotherapy for the first time, could read and speak Turkish, had no history of seizures, had no cranial metastasis, had not been diagnosed with psychiatric disorders, and did not have dementia, hearing/sighted and volunteer patients who agreed to participate in the study were included.

Patients who are in Stage IV in terms of disease stage, those who have vertigo, those who have received chemotherapy before, those who have hyperemesis during pregnancy, those who tend to nausea and vomit during their travels, and those who do not want to participate in the study were not included in the study. Therefore, chemotherapy or cancer type was not considered while selecting the sample.

Data Collection

The study was conducted at an Oncology Hospital Hacettepe in Ankara with 63 patients with the diagnosis of stage I-II-III cancer who applied to the medical oncology service and day treatment unit between 27/01/-01/06/2020 and were accepted to be included in the study after will receive a chemotherapy course for the first time. Thirty-one patients were evaluated as an intervention group and 32 as a control group. It was explained to the 63 patients, who were considered the sample group, that the participation was voluntary and that there were options to leave if desired at any stage of the research. The study's data were obtained from the patients who agreed to participate after detailed information was given about the study.

Patients who were evaluated as an intervention group that met the research criteria were provided with a patient identification form before the start of chemotherapy infusion, their first vital signs were measured and recorded in the vital signs follow-up form, and then the patient was provided with a state anxiety scale to be filled in. During chemotherapy, the patient was placed in a semi-fowler position in their bed. After the chemotherapy infusion started, wearing VR glasses, and watching videos such as a world tour, a walk in the forest, nature walks, and a beach for between 30 minutes and 40

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minutes, depending on the patient's viewing time. After the chemotherapy infusion was completed, the vital signs measurement was repeated and recorded, and the state anxiety scale was provided to be filled in again.

Patients who were evaluated as a control group were provided with a patient identification form before the start of chemotherapy infusion, their first vital signs were measured and recorded in the vital signs follow-up form, and the patients were provided with a state anxiety scale to be filled in. During chemotherapy, the patient was given in a semi-fowler position in their bed. There was no application during the chemotherapy infusion; the patient was subjected to routine chemotherapy performed in the hospital. The patients in the control group remained in the same position as those in the experimental group during chemotherapy and just rested. After the chemotherapy infusion was completed, vital signs (blood pressure, pulse, respiration, saturation) were monitored, and the state anxiety scale was applied. After the research, VR was used for the patients in the control group who wanted it in the following cures.

Family members stayed in the room in both groups, but the patient was asked not to communicate with the patient during the VR glasses application.

Patient Identification Form: Firstly, the patients were informed about the research in the introduction form. Finally, 11 open-ended questions about age, gender, occupation, employment status, etc., were asked of the patients who agreed to participate in the study.

Spielberger State Anxiety Inventory: The Spielberger state anxiety inventory was developed by Spielberger in 1966. In 1976, Öner and Le Compe (1983) translated it into Turkish, and validity and reliability studies were carried out in 1977[16]. The Spielberger state anxiety inventory consists of 20 questions and four ratings (never, sometimes, frequently, almost always), and it is applied to understand how people are feeling at the moment. The scale contains two types of statements with 20 items. Direct statements express negative emotions, and reverse statements express positive emotions. In the state anxiety scale, the reverse statements are items 1, 2, 5, 8, 10, 11, 15, 16, 19 and 20. State anxiety scores are obtained by subtracting the total score for direct statements from the total score for reverse statements and adding the predetermined invariant value. The constant value for the state anxiety scale is 50. A high score indicates a high level of anxiety. It is reported that the reliability coefficients of the scale vary between 0.83 and 0.87.

In this study, the Cronbach-α reliability coefficient was found to be 0.92 before chemotherapy of the intervention group, 0.90 after chemotherapy, 0.90 before chemotherapy of the control group, and 0.90 after chemotherapy.

Vital Signs Follow-up Form: Blood pressure, pulse, respiration, and saturation (vital signs) by the researcher, who was a clinical nurse, were followed up and recorded in the vital signs follow-up form before starting the chemotherapy infusion and after the chemotherapy protocol was finished, in the intervention and control group consisting of 60 patients. Measurements were made from the patient's desired arm. The vital signs were measured because they affected the anxiety people experienced during chemotherapy. After the lack of information that fever is a vital sign affected by anxiety

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in the literature review and the lack of fever monitoring in a similar[17], fever monitoring was not performed in practice. Omron brand M3 model sphygmomanometer supplied by the researcher was used to set a standard for vital signs measurement, and G-LIFE YK-81B finger type device was used for saturation and heart rate monitoring provided by the researcher.

Virtual Reality Glasses: The research used Samsung Gear VR SM-R323 brand and model SG glasses provided by the researcher. Patients were offered four different options to watch "Forest of Serenity," "Calm Place," "Happy Place," and "Gala 360 Travel & Relax". Forest of Serenity is a nature video consisting of bird sounds, colorful trees and flowers, and a clear lake where fish can be seen swimming. Calm Place is a relaxing video where cycles are shown 24 hours a day, where a person finds himself by the lake in the forest in snowy, rainy, sunny weather. In Happy Place, one is in a virtual camp environment where natural events such as dynamically changing weather, day-night cycles, and falling stars are experienced. Gala 360 Travel & Relax is a Paris-Notre Dame museum tour video.

After the patients were informed about the video content, they were asked which one they preferred to watch. The videos they chose for the intervention group during chemotherapy were watched through VR glasses. The patients' preferences were more in favor of nature videos. The most-watched videos were "Forest of Serenity," "Calm Place," and "Happy Place," respectively. The use of VR does not pose a safety risk for patients.

The Ethical Dimension of the Research

The permission of the ethics committee required for the conduct of the research was obtained from the Ethics Committee of Ankara Yıldırım Beyazıt University with the number 2019-438 dated 13.11.2019. The application permissions for the questionnaire and the scales used were obtained from the Chief Medical Office of the Oncology Hospital where the research was conducted.

Data Analysis

Statistical analyses were performed using the package program called SPSS (IBM SPSS Statistics 24). Frequency tables and descriptive statistics were used to interpret the findings. In accordance with parametric methods, the "Independent Sample-t" test (t-table value) was used to compare the measurement values of two independent groups, and the "ANOVA" test (F-table value) method was used to compare the measurement values of three or more independent groups. When comparing the measurement values of two dependent groups, the "Paired Sample-T" test (t-table value) method was used, and non-parametric methods were used for measurement values unsuitable for the normal distribution. In accordance with non-parametric methods, the "Mann-Whitney U" test (Z-table value) was used to compare the measurement values of two independent groups, the "Kruskal-Wallis H" test (x^2- table value) was used to compare the measurement values of three independent or more groups. The "Wilcoxon" test (Z-table value) method was used to compare the measurement values of the two dependent groups. According to the expected value levels in the study of the relationship between two qualitative variables, the Fisher-Exact test and "Pearson x^2 cross tables" were used. A value of $p<0.05$ was considered statistically significant.

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Results

The intervention group included in this study consists of 30 patients, 50% of whom are male and 50% female. Of these, 80% are married, and 96.7% have children. The majority of the intervention group, 33.33%, are between the ages of 56 - 65, and this group's average age was 58.80±13.22 (years). The study's control group consists of 50% male and 50% female patients, 76.7% of these 30-person control groups are married, and 86.7% have children. The majority of this group, 33.33%, consists of patients aged 56-65 years, and the average age was 59.07±13.08 (years).

Table 1. Pulse, respiration, blood pressure, and saturation values of the intervention and control groups before/after chemotherapy.

Vital Signs		**Intervention Group (n=30)**	**Control group (n=30)**	**Statistical analysis* Possibility**
		$\underline{X} \pm S.S.$	$\underline{X} \pm S.S.$	
Pulse	Before Chemotherapy	85.93±15.73 /min	87.33±16.05 /min	t=-0.341 p=0.734
	After Chemotherapy	78.53±15.38 /min	81.13±12.84 /min	t=-0.711 p=0.480
Statistical analysis Possibility		**t=5.154 p=0.000**	**t=3.962 p=0.000**	
Respiratory	Before Chemotherapy	20.40±1.52/min	20.00±2.10 /min	Z=-1.026 p=0.305
	After Chemotherapy	18.07±1.53/ min	19.87±1.89 /min	**Z=-3.591 p=0.000**
Statistical analysis Possibility		**Z=-4.636 p=0.000**	Z=-0.577 p=0.564	
Systolic BP	Before Chemotherapy	128.90±21.56 mmHg	127.33±18.32 mmHg	t=0.303 p=0.763
	After Chemotherapy	120.20±15.31 mmHg	123.00±18.54 mmHg	t=-0.638 p=0.526
Statistical analysis Possibility		**t=3.602 p=0.001**	t=2.039 p=0.051	
Diastolic BP	Before Chemotherapy	77.60±11.32 mmHg	80.27±11.09 mmHg	t=-0.922 p=0.361
	After Chemotherapy	74.77±11.90 mmHg	78.97±11.40 mHg	t=-1.396 p=0.168
Statistical analysis Possibility		t=1.865 p=0.072	t=0.717 p=0.479	
Saturation	Before Chemotherapy	%96.80±1.94	%96.23±2.33	Z=-0.876 p=0.381

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	After Chemotherapy	%97.13±1.72	%95.10±2.14	**Z=-3.507 p=0.000**
Statistical analysis Possibility		**Z=-0.837 p=0.402**	**Z=-2.837 p=0.005**	

* In data with a normal distribution, the "Independent Sample-t" test (t-table value) was used to compare the measurement values of two independent groups; the "Paired Sample-t" test (t-table value) was used to compare the two dependent groups. The "Mann-Whitney U" test (Z-table value) was used to compare the measurement values of the two independent groups in data that did not have a normal distribution; the "Wilcoxon" test (Z-table value) statistics were used to compare the two dependent groups.

According to the measurements conducted in the intervention group within the scope of the study, a statistically significant difference was found in terms of pulse, respiratory systolic blood pressure, and saturation values before chemotherapy and during chemotherapy after using VR glasses (T=5.154; p=0.000, Z=-4.636, p=0.000 t=3.602, p=0.001, t=1.865, p=0.072 Z=-0.837, p=0.402).

When the control group was examined, although there was a statistically significant difference in heart rate and saturation values (t=3.962; p=0.000, Z=-2.837; p=0.005) before chemotherapy, it was lower than the values of the intervention group. In addition, no statistically significant differences were found in the control group in terms of respiratory, systolic blood pressure, and diastolic blood pressure values (p>0.05).

The groups found no statistically significant difference in respiratory, systolic, and diastolic blood pressure and saturation values measured before chemotherapy (p>0.05). There was a statistically significant difference between the groups in terms of respiratory values measured after the chemotherapy (Z=-3.591; p=0.000). There was a statistically significant difference between the groups in terms of saturation values measured after the chemotherapy (Z=-3.507; p=0.000). Although there was no statistical significance in the saturation values measured before and after chemotherapy in the intervention group, it was determined to be higher after chemotherapy (p>0.05).

Table 2. Comparison of the state anxiety scale scores measured before and after chemotherapy treatment of the intervention and control group.

State anxiety inventory	**Intervention Group (n=30)**	**Control group (n=30)**	**Statistical analysis* Possibility**
	$\underline{X} \pm S.S.$	$\underline{X} \pm S.S.$	
Before Chemotherapy	39.03±10.14	41.76±9.24	t=-1.092 p=0.280
After Chemotherapy	30.60±8.20	39.70±8.82	**t=-4.140 p=0.000**
Statistical analysis Possibility	**t=10.406 p=0.000**	**t=2.518 p=0.018**	

* In data with a normal distribution, the "Independent Sample-t" test (t-table value) was used to compare the measurement values of two independent groups; the "Paired Sample-t" test (t-table value) was used to compare the two dependent groups.

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A statistically significant difference was found in the intervention group in terms of the state anxiety scale scores measured before chemotherapy and the scores measured after chemotherapy (t=10.406; p=0.000), and it was observed that the state anxiety scale scores measured after chemotherapy was found to be lower at a statistically significant level than the scores measured before chemotherapy.

In the control group, a statistically significant difference was found in the state anxiety scale scores measured before and after chemotherapy (t=2.518, p=0.018). It was observed that the state anxiety scale scores measured after chemotherapy were lower at a statistically significant level than those measured before chemotherapy (Table 2).

There was no statistically significant difference in the state anxiety scale scores measured before chemotherapy compared to the groups (p>0.05). However, a statistically significant difference was found between the groups in terms of the state anxiety scale scores measured after chemotherapy (t=-4.140; p=0.000), and the state anxiety scale scores measured after chemotherapy in the intervention group were found to be statistically significantly lower than in the control group.

Table 3. Comparison of the state anxiety scale scores according to the demographic characteristics of the intervention and control groups.

	INTERVENTION GROUP			**CONTROL GROUP**		
		Before chemotherapy	**After chemotherapy**		**Before chemotherapy**	**After chemotherapy**
		State anxiety inventory			**State anxiety inventory**	
Variable	**n**	$\underline{X} \pm S.S.$	$\underline{X} \pm S.S.$	**n**	$\underline{X} \pm S.S.$	$\underline{X} \pm S.S.$
Gender						
Female	15	39.87±12.14	31.13±9.45	15	44.07±5.80	41.20±6.81
Male	15	38.20±8.00	30.07±7.03	15	39.47±11.48	38.20±10.48
Statistical analysis*		t=0.444	t=0.351		t=1.385	t=0.930
Possibility		p=0.660	p=0.728		p=0.177	p=0.360
Marital Status						
Married	24	40.04±9.96	30.92±8.69	23	41.04±9.94	39.13±9.76
Single	6	35.00±8.22	29.33±6.31	7	44.14±4.41	41.57±4.58
Statistical analysis*		t=1.094	t=0.417		t=-0.722	t=-0.635
Possibility		p=0.283	p=0.680		p=0.447	p=0.531
Education level						
Elem.[x] and under	18	39.06±9.99	29.33±7.51	18	43.00±8.72	41.56±8.43
Secondary school	6	40.67±9.97	34.33±9.35	6	43.83±9.30	39.83±8.68
U.[x] and above	6	37.33±8.47	30.67±9.40	6	36.00±9.96	34.00±9.08
Statistical analysis*		F=0.153	χ^2=1.330		F=1.534	F=1.737
Possibility		p=0.859	p=0.514		p=0.234	p=0.195
Profession						
Retired	19	38.68±10.47	30.21±8.50	12	42.67±11.16	43.0 [12.5]
Other	11	39.64±10.00	31.27±8.00	18	41.17±8.00	39.5 [10.8]
Statistical analysis*		t=-0.244	t=1.319		t=0.429	t=0.610
Possibility		p=0.809	p=0.198		p=0.671	p=0.547

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Income Status						
Income<Expenditure	17	38.18±9.45	29.65±7.92	13	42.85±9.65	41.46±9.39
Income>Expenditure	13	40.15±9.95	31.85±8.70	17	40.94±9.12	38.35±8.39
Statistical analysis*		t=-0.523	Z=-0.670		t=0.553	t=0.956
Possibility		p=0.605	p=0.503		p=0.585	p=0.347
The stage of the disease						
1st	11	40.91±12.04	31.36±8.43	5	35.60±9.56	35.60±8.47
2nd	12	39.42±9.48	31.83±9.22	12	43.33±6.58	41.67±6.30
3rd	7	35.43±5.59	27.29±5.79	13	42.69±10.81	39.46±10.80
Accompanying disease						
Statistical analysis*		F=0.623	F=0.742		F=1.388	F=0.834
Possibility		p=0.544	p=0.486		p=0.267	p=0.445
None	17	37.76±11.63	29.24±8.88	18	39.89±8.67	37.44±8.21
One disease	7	41.57±9.47	31.86±8.43	7	44.43±11.90	42.00±10.69
Two diseases	6	39.67±6.38	33.00±6.07	5	44.80±6.87	44.60±6.58
Statistical analysis*		F=3.196	χ^2=1.936		F=0.927	F=1.674
Possibility		p=0.057	p=0.380		p=0.408	p=0.206
Health Status						
Bad/medium	11	42.55±10.37	33.09±7.37	10	44.30±9.44	41.30±10.00
Good	19	37.00±9.69	29.16±8.49	20	40.50±9.11	38.90±8.32
Statistical analysis*		t=1.473	Z=-1.594		t=1.064	t=0.697
Possibility		p=0.152	p=0.111		p=0.296	p=0.492

* "Independent Sample-t" test (t-table value) was used to compare the measurement values of two independent groups in data with normal distribution; the "Mann-Whitney U" test (Z-table value) was used to compare the measurement values of two independent groups in data without normal distribution. "ANOVA" test (F-table value) was used to compare the measurement values of three or more independent groups in the data with normal distribution; "Kruskal-Wallis H" test (χ^2-table value) statistics were used to compare the measurement values of three or more independent groups without normal distribution. ˣElem: Elementary U.: University

In the intervention group, there was no statistically significant difference in pre-chemotherapy state anxiety scale scores and post-chemotherapy state anxiety scale scores according to gender, marital status, education level, occupation, income level, disease stage, accompanying disease, and health status (p>0.05).

In the control group, which is the other study group, there was no statistically significant difference in pre-chemotherapy state anxiety scale scores and post-chemotherapy state anxiety scale scores according to gender, marital status, education level, occupation, income level, disease stage, and health status (p>0.05) (Table 3).

Discussion

This study examined the effects of virtual reality glasses on the anxiety status and vital signs of patients receiving chemotherapy. As a result of the research, it was found that VR glasses have differences observed across the groups on vital signs and reduce the level of state anxiety. In a world where the number of cancer patients is increasing daily, it

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should be possible to use VR glasses in clinics, since it is thought that the use of proven VR glasses will impact the quality of life of individuals with cancer. The results show that the study is remarkable.

When the pulse values in the sample group consisting of sixty (60) patients who received chemotherapy for the first time were examined, a statistically significant decrease was found between before and after chemotherapy in both the intervention group and the control group. However, while the difference in the reduction in pulse values before and after chemotherapy was lower in the control group, the difference in the decrease in pulse values in the intervention group was statistically significantly higher. In the intervention group, t=5.154; p=0.000 values were obtained statistically in terms of pulse values according to the first measured value after using VR glasses (Table 1). These values suggest that watching relaxing videos using VR glasses during chemotherapy treatment effectively reduces pulse values. In one study, the differences between pulse rates were statistically significant in the progressive muscle relaxation and VR groups[18]. These findings in the literature and related to the pulse values obtained in our study are parallel. A low pulse rate is also important as it indicates that the patient remains calm.

When the respiration values measured before and after chemotherapy of the patients who participated in the research were examined; it was found that the respiration values measured after chemotherapy in the intervention group, in which relaxing videos were watched using VR glasses, were found to be significantly lower than the respiratory values measured in the control group. It was observed that the calculated respiration rates of those in the intervention group after chemotherapy were significantly lower than before (Z=-4.636; p=0.000) (Table 1). In the literature review, there has been no research on the effects of VR glasses during chemotherapy on respiration rate. However, in a study of patients with prostate biopsy and port catheter implantation, there was a decrease in respiratory[19,20]. As a result, it can be concluded that the decrease in respiration values with the application of glasses leads to a change in the desired direction in patients' anxiety and concern levels. This is ultimately a good situation in terms of patient care.

When the systolic blood pressure values were examined, it was determined that the systolic blood pressure values after chemotherapy were significantly lower in the intervention group compared to the systolic blood pressure values measured before chemotherapy. Chirico et al. (2020), in their study examining the effect of music therapy and VR application on chemotherapy patients in reducing anxiety, stated that both methods were effective, but the VR application was more effective[21]. In addition, a decrease in systolic blood pressure was observed due to VR application in two different studies[19,20]. Based on this information, the difference in systolic blood pressure values results is likely to be related to the fact that the VR application is more effective.

When diastolic blood pressure values were examined, there was no significant change in diastolic blood pressure values before and after chemotherapy in both the intervention and the control group (p>0.05) (Table 1). No study in the literature examines the effects of VR application on the diastolic blood pressure of chemotherapy patients with whom we can compare this finding. One a study, VR application didn't significantly reduce pain and stress during the chemotherapy[22]. However, Brown et al. (2013), in their study on

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the stress perception of the environment in which people are under stress, observed that exposing patients to the image of nature during stress[23]. The results obtained in these studies are in line with the results obtained in this study. In other studies, a decrease in diastolic blood pressure was observed due to VR application[19,20]. In another study, the differences between blood pressure were statistically significant in the progressive muscle relaxation and VR groups[18]. It is thought that the different results related to blood pressure may be because the related variable is affected by other factors.

When the saturation values were examined, when the values before and after chemotherapy were compared in the intervention group, an increase was observed in the saturation values after the intervention, although it was not statistically significant. In the control group, a decrease in the saturation values after chemotherapy compared to before (Z=-2.837; p=0.005) suggests that VR application may have differences observed across the group despite the saturation value (Table 1). Studies with different patient groups also support our results[19,20]. In this regard, this study results are pleasing.

When the measurements before and after chemotherapy were evaluated; a statistically significant difference was found between the groups in terms of the state anxiety scale scores measured after chemotherapy (t=-4.140; p=0.000), and it was determined that the state anxiety scale scores measured after chemotherapy in the intervention group were significantly lower than in the control group. The post-chemotherapy state anxiety scale scores of both groups were found to be significantly lower than before chemotherapy. However, it is seen that this decrease is more in the intervention group (intervention group t=10.406; p=0.000 - control group t=2.518; p=0.018) (Table 2). The decrease in anxiety levels in the control group may be related to the relief experienced due to the end of chemotherapy. The fact that the decrease in the intervention group was greater compared to the control group may be related to the positive effect of the VR glasses application. These findings suggest that watching the relaxing images that the intervention group voluntarily prefers with VR glasses can effectively reduce the anxiety that patients experience intensely during the first chemotherapy session. When a literature review is performed, it is found that watching comforting images of patients receiving chemotherapy treatment using VR glasses reduces anxiety and that patients feel happier[18,19-21,23].

According to Gerçeker's study, VR is an effective distraction method in reducing port needle-related pain, fear, and anxiety in Pediatric Hematology-Oncology patients[24]. Chirico et al. (2020), in their study investigating the effects of VR application and music therapy on anxiety levels and people's emotional states in 94 chemotherapy patients, determined that both distraction practices reduce anxiety and positively affect people's emotional states. It has also been noted that VR application is more effective than music therapy in reducing anxiety and regulating mood[21].

In a randomized controlled study conducted by Mohammad and Ahmad (2019) with 80 breast cancer patients in Jordan, the effect of watching videos about sitting on the beach and deep-sea diving using VR glasses on the state of anxiety in chemotherapy patients was studied. It has been observed that using VR glasses administered in combination with morphine significantly reduces anxiety scores compared to morphine alone[25]. Espinoza et al. (2012) reported that watching fun and relaxing images with the help of

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VR glasses for 33 cancer patients between the ages of 41-85 reduces stress levels and increases happiness levels by reducing negative emotions[26]. In a study conducted by Banos et al. (2011), they investigated how VR technology affects the moods of 19 metastatic cancer patients aged between 29-85 who were hospitalized; they observed that entertaining and relaxing images watched with VR increase the positive emotions of the patients and decrease their negative emotions[27]. Similarly, another study determined that the application of VR glasses decreased the anxiety scores of patients with gynecological cancer in the preoperative period[28].

As a result, considering that patients experience intense anxiety due to the impact of the situation caused by uncertainties during the first chemotherapy session, it can be said that the decrease in the level of anxiety caused by the use of VR glasses is quite pleasing promising. In this context, it is thought that these practices that accompany the care will have good results for the wellbeing of the patients.

It was determined that there was no statistically significant difference in the pre-chemotherapy state anxiety scale scores and post-chemotherapy state anxiety scale scores according to gender, marital status, education level, occupation, income level, disease stage, accompanying disease, and health status in the intervention and control groups (Table 3). It can be concluded from this conclusion that sociodemographic characteristics do not primarily affect the level of anxiety.

Conclusion

These preliminary findings support using VR in clinical oncology settings to improve patients' anxiety. For example, it was observed that the intervention group and control group consisting of thirty patients had differences observed across the groups in pulse rate, respiratory rate, systolic blood pressure values, an increase in saturation values, and a significant improvement in the level of state anxiety.

The influence of age, sex, and treatment differences should continue to be examined to support recommendations regarding patients' suitability for VR interventions. In line with these results, it is recommended the use of virtual reality glasses with different age groups and videos, examination of the effect on other symptoms (such as fatigue and nausea-vomiting), application of it in ongoing chemotherapy sessions, and to inform, especially oncology nurses, and all nurses working with chronic patients about the use of virtual reality glasses.

Limitations of the Study: The sample can't be randomized.

Credit Authorship Contribution Statement

SO: Conceptualization, Data curation, Writing, Investigation.

BI: Software, Methodology, Visualization, Supervision,

Funding: The author(s) received no financial support for this article's research, authorship, and/or publication.

Declaration of Competing Interest: The authors declare no potential conflicts of interest with respect to the research, authorship, and publication of this study.

Acknowledgments: The researchers are grateful to all patients who participated in the study.

REFERENCES

1. World Health Organization. Cancer. World Health Organization. https://www.euro.who.int /en/health topics/noncommunicable-diseases/cancer. Published July 2022. Accessed 12 July 2022.

2. Türkiye İstatistik Kurumu. Ölüm ve ölüm nedeni istatistikleri 2019. Türkiye İstatistik Kurumu. https://data.tuik.gov.tr/Bulten/Index?p=Olum-ve-Olum-Nedeni-Istatistikleri-2019-33710. Published July 2022. Accessed 23 July 2022.

3. Global Cancer Observatory. Turkey. World Health Organization. https://gco.iarc.fr/today/data/factsheets/populations/792-turkey-fact-sheets.pdf. Published August 2023. Accessed 23 August 2023.

4. Arrieta O, Angulo LP, Valaencia CN, et al. Association of depression and anxiety on quality of life, treatment adherence, and prognosis in patients with advanced non-small cell lung cancer. *Annals of Surgical Oncology*. 2013;20(6):1941–1948.

5. Li WHC, Chung JOK, Ho EKY, et al. Effectiveness and feasibility of using the computerized interactive virtual space in reducing depressive symptoms of Hong Kong Chinese children hospitalized with cancer. *Journal for Specialist Pediatric Nursing*. 2011;16(3):190–198. doi: 10.1111/j.1744-6155.2011.00288.x.

6. Caliskan E, Gurhan N, Tekgunduz AIE. Distress, anxiety and depression in patients who have received hematologic cancer diagnosis. *Acta Oncologica Turcica*. 2017;50(3):207-17.

7. Eker A, Aslan E. Jinekolojik kanser hastalarında psiko-sosyal yaklaşım. *Journal of Educational Research in Nursing*. 2017;14(4):298–303.

8. Tennant M, Youssefa GJ, McGillivraya J, et al. Exploring the use of immersive virtual reality to enhance psychological well-being in pediatric oncology: A pilot randomized controlled trial. *European Journal of Oncology Nursing*. 2020;48:101804.

9. Beikmoradi A, Najafi F, Roshanaei G, et al. Acupressure and anxiety in cancer patients. *Iran Red Crescent Medical Journal*. 2015;17(3):1. doi: 10.5812/ircmj.25919.

10. Clus D, Larsen ME, Lemey C, et al. The use of virtual reality in patients with eating disorders: Systematic review. *Journal of Medical Internet Research*. 2018;20(4):1–9.

11. Indovina P, Barone D, Gallo L, et al. Virtual reality as a distraction intervention to relieve pain and distress during medical procedures: A comprehensive literature review. *The Clinical Journal of Pain*. 2018;34(9):858-877. doi: 10.1097/AJP.0000000000000599.

12. Sharar SR, Alamdar A, Hoffer C, et al. Circumplex model of affect: A measure of pleasure and arousal during virtual reality distraction analgesia. *Games for Health Journal*. 2016;5(3):197–202. doi: 10.1089/g4h.2015.0046.

13. Triberti S, Repetto C, Riva G. Psychological factors influencing the effectiveness

of virtual reality-based analgesia: A systematic review. *Cyberpsychol Behavior Social Networking*. 2014;17(6):335–345. doi: 10.1089/cyber.2014.0054.

14. Wiederhold BK, Gao K, Sulea C, et al. Virtual reality as a distraction technique in chronic pain patients. *Cyberpsychol Behavior Social Networking*. 2014;17(6):346–352.

15. Matheve T, Bogaerts K, Timmermans A. Virtual reality distraction induces hypoalgesia in patients with chronic low back pain: A randomized controlled trial. *Journal of Neuroengineering Rehabilitation*. 2020;17(1):55. doi: 10.1186/s12984-020-00688-0.

16. Oner N, Le Compte A. *Durumluk Sürekli Kaygı Envanteri El Kitabi*. Istanbul: Boğaziçi Üniversitesi Yayınları; 1983.

17. Nguyen TN, Nilson S, Hellström AL, et al. Music therapy to reduce pain and anxiety in children with cancer undergoing lumbar puncture: A randomized clinical trial. *Journal of Pediatric Oncology Nursing*. 2010;27(3):146-155. doi: 10.1177/1043454209355983.

18. Sahin G, Basak T. The effects of intraoperative progressive muscle relaxation and virtual reality application on anxiety, vital signs, and satisfaction: A randomized controlled trial. *Journal of PeriAnesthesia Nursing*. 2020;35(3):269-276.

19. Menekli T, Yaprak B, Dogan R. The effect of virtual reality distraction intervention on pain, anxiety, and vital signs of oncology patients undergoing port catheter implantation: A randomized controlled study. *Pain Management Nursing*. 2022;23(5):585-90.

20. Genc H, Korkmaz M, Akkurt A. The effect of virtual reality glasses and stress balls on pain and vital findings during transrectal prostate biopsy: A randomized controlled trial. *Journal of PeriAnesthesia Nursing*. 2022;37(3):344-350.

21. Chirico A, Maiorano P, Indovina P, et al. Virtual reality and music therapy as distraction interventions to alleviate anxiety and improve mood states in breast cancer patients during chemotherapy. *Journal of Cellular Physiology*. 2020;235(6):5353–5362.

22. Scates D, Dickinson JI, Sullivian K, et al. Using nature-inspired virtual reality as a distraction to reduce stress and pain among cancer patients. *Environment and Behavior*. 2020;52(8):895-918. doi: 10.1177/0013916520916259.

23. Brown DK, Barton JL, Gladwell VF. Viewing nature scenes positively affects recovery of autonomic function following acute-mental stress. *Environment Science Technology*. 2013;47(11):5562-5569. doi: 10.1021/es305019p.

24. Gerçeker GO, Bektas M, Aydınok M, et al. The effect of virtual reality on pain, fear, and anxiety during access of a port with huber needle in pediatric hematology-oncology patients: Randomized controlled trial. *European Journal of Oncology Nursing*. 2021;50:101886. doi: 10.1016/j.ejon.2020.101886.

25. Mohammad EB, Ahmad M. Virtual reality as a distraction technique for pain and anxiety among patients with breast cancer: A randomized control trial. *Palliative Support Care*. 2019;17(1):29–34. doi: 10.1017/S1478951518000639.

26. Espinoza M, Banos RM, Palocios AG, et al. Promotion of emotional wellbeing in oncology inpatients using VR. *Annual Review CyberTherapy Telemedicine*. 2012;10:53–57.

27. Banos RM, Espinazo M, Palacios AG, et al. A positive psychological intervention using virtual reality for patients with advanced cancer in a hospital setting: A pilot study to assess feasibility. *Support Care Cancer*. 2013;21(1):263–270.

28. Chan JJI, Yeam JT, Kee HM, et al. The use of preoperative virtual reality to reduce anxiety in women undergoing gynecological surgeries: A prospective cohort study. *BMC Anesthesiology*. 2020;20:261. doi: 10.1186/s1287.