Evaluation of the Effectiveness of Vestibular Rehabilitation With Virtual Reality Systems in Individuals With Visually Induced Motion Sickness

NCT: Pending

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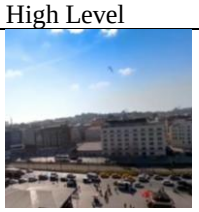
Study Protocol

A test protocol was developed to provide vestibular rehabilitation using virtual reality systems for individuals with visually induced motion sickness (VIMS).

The study protocol consists of three phases:

In the first phase, all participants underwent the Simulator Sickness Questionnaire (SSQ) and static posturography tests, including Balance Screening and Limit of Stability assessments, prior to the initial evaluation. Subsequently, participants were exposed to 5 - minute YouTube open-access 360° virtual reality (VR) videos with varying difficulty levels determined beforehand. The initial evaluation lasted 30 minutes and was structured as follows: 5 minutes of easy stimulation followed by 5 minutes of rest, 5 minutes of moderate stimulation followed by 5 minutes of rest, and 5 minutes of high stimulation followed by 5 minutes of rest. During each 5-minute stimulation, heart rate and balance screening tests were measured at minutes 1, 3, and 5. After the total 15 minutes of stimulation, final measurements including the SSQ, balance screening, and Limit of Stability tests were repeated (Table 1).

Table 1 Phase I: Initial Evaluation Protocol

Phase I	Easy Level		Moderate Level		High Level	
Stimulus	 **Walking Video**		 **Driving Video**		 **Drone Video**	
Pre-stimulation	Simulator Sickness Questionnaire (SSQ) Balance Screening Limit of Stability					
Order of Stimulation	During each 5-minute stimulation, Balance Screening (BS) and heart rate measurements were taken at minutes 1, 3, and 5.	5-minute rest period	During each 5-minute stimulation, Balance Screening (BS) and heart rate measurements were taken at minutes 1, 3, and 5.	5-minute rest period	During each 5-minute stimulation, Balance Screening (BS) and heart rate measurements were taken at minutes 1, 3, and 5.	5-minute rest period
Post-stimulation	Simulator Sickness Questionnaire (SSQ) Balance Screening Limit of Stability					
Qualitative Data Collection Tool	SSQ		SSQ		SSQ	

Quantitative Data Collection Tool	Balance Screening Heart Rate Monitor	Balance Screening Heart Rate Monitor	Balance Screening Heart Rate Monitor

In the second phase, a four-week rehabilitation program was designed for individuals with VIMS, consisting of two 1-hour sessions per week (Table 2). The prepared rehabilitation program was administered to the study group using virtual reality systems.

Table 2 4-week rehabilitation program

	Seans	Seans
Two sessions per week	6 × 5-minute easy stimulations (with 5-minute rest periods between stimulations)	4 × 5-minute easy stimulations plus 2 × 5-minute moderate stimulations (with 5-minute rest periods between stimulations)
Two sessions per week	6 × 5-minute moderate stimulations (with 5-minute rest periods between stimulations)	2 × 5-minute easy stimulations plus 4 × 5-minute moderate stimulations (with 5-minute rest periods between stimulations)
Two sessions per week	6 × 5-minute moderate stimulations (with 5-minute rest periods between stimulations)	3 × 5-minute moderate stimulations plus 3 × 5-minute high stimulations (with 5-minute rest periods between stimulations)
Two sessions per week	6 × 5-minute high stimulations (with 5-minute rest periods between stimulations)	30-minute final evaluation session: 1 × 5-minute easy stimulation + 2 × 5-minute moderate stimulations + 3 × 5-minute high stimulations

In the third phase, following the rehabilitation program, participants were reassessed using the Simulator Sickness Questionnaire (SSQ), and static posturography tests, including Balance Screening and Limit of Stability assessments, were repeated.

Statistical Analysis

The data obtained in this study were analyzed using Statistical Package for Social Sciences (SPSS) for Windows, version 25.0. Descriptive statistical methods (number, percentage, minimum-maximum values, mean, and standard deviation) were used to summarize the data. The normality of the data was assessed using skewness and kurtosis values. For normally distributed data, independent-samples t-tests were used to compare quantitative variables between two independent groups, and paired-samples t-tests were used to compare two dependent groups. Pearson correlation was applied to examine relationships between numerical variables. For data that were not normally distributed, the Friedman test was used for comparisons of more than two dependent groups. When a significant difference was found, the adjusted Bonferroni test was used to identify the group causing the difference. Spearman correlation was used to assess relationships between numerical variables. The homogeneity of categorical variables was examined using the Chi-square test.

Informed Volunteer Consent Form

Dear Volunteer,

This study is being conducted by Research Assistant and Audiologist Rukiye TANISIR DISCI under the supervision of Istanbul Aydın University, Assistant Professor, PhD Umit Can CETİNKAYA.

In our study, the Visual-Induced Motion Sickness Susceptibility Questionnaire (GUHHYSA) will be administered, and audiological evaluations will be conducted for individuals over 18 years of age. Based on the evaluations, individuals diagnosed with Visually Induced Motion Sickness will participate in a rehabilitation program using virtual reality systems.

Participation in this study is entirely voluntary. Your personal information will not be shared with any third parties or institutions and will be kept strictly within the scope of this research. Any records that could reveal the identity of participants will be kept confidential and will not be disclosed to the public; even if the research results are published, the identities of participants will remain confidential.

I have read and understood the information provided above, which must be given to the volunteer before starting the research.

I have been given sufficient time to decide whether or not I want to participate in the study. Under these conditions, I authorize the research investigator to review, transfer, and process my medical information, and I voluntarily accept the invitation to participate in this research without any coercion or pressure. I declare that I freely consent to my personal data being used for scientific purposes, presented and published in accordance with confidentiality rules, without being subjected to any pressure or coercion.

You are being asked to participate in a research study containing the information provided above. Participation is entirely your choice. It is important that you understand why the research is being conducted, how your information will be used, what the study involves, and any potential benefits, risks, or discomforts before deciding whether to participate.

Researcher Name and Surname:	Participant Name and Surname:
Contact Number:	Contact Number:
Signature:	Signature: