INPLASY

Effects of virtual reality technology on cognition and negative emotion in patients after stroke: a Meta-analysis

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ADMINISTRATIVE INFORMATION

Support - National Natural Science Foundation of China (No. : 72261032).

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY2024100044

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 10 October 2024 and was last updated on 10 October 2024.

INTRODUCTION

Review question / Objective To evaluate the effect of virtual reality technology on cognitive function and negative emotion in patients with stroke.

Condition being studied Stroke is a common acute cerebrovascular disease, which is a limitation or whole brain dysfunction caused by many reasons such as blockage or rupture of blood vessels in the brain. At present, it has become the first cause of adult disability and death in China. 92% of stroke patients will experience post-stroke cognitive impairment (PSCI), which involves five cognitive domains including long-term memory, attention, visuospatial ability, executive function and language. PSCI has a long duration and wide impact. 60% of stroke patients still have varying degrees of cognitive dysfunction more than a decade later, which not only significantly affects daily life, but also has a profound negative impact on patients' emotions. Emotional disorders such as anxiety and depression are often associated with stroke patients, which further reduce the social participation of patients, seriously hinder the rehabilitation process, and have a serious impact on the quality of life and survival time of patients. Therefore, timely cognitive assessment and early intervention are important links to improve the quality of cognitive rehabilitation management for stroke patients. The Adult Stroke Rehabilitation Treatment Guide emphasizes the importance of cognitive function training in stroke rehabilitation, and recommends the assessment of cognitive function domains and severity of impairment to develop targeted rehabilitation intervention programs.

Traditional cognitive rehabilitation training is carried out under specific conditions and specific environments, such as repetitive transcranial magnetic stimulation, hyperbaric oxygen therapy, acupuncture and so on. Due to the complexity of cognitive function, this training method is boring and lacks of individuation, which results in great differences in clinical practice. virtual reality (VR) is

an emerging rehabilitation training technology, through the computer hardware and software to achieve the interactive simulation created by the computer to provide participants with vivid and interesting virtual scenes, visual, auditory, tactile and other senses of feedback, with immersive, imaginative and interactive characteristics. VR technology improves the accuracy and efficiency of cognitive function assessment by simulating diverse virtual environments and providing immersive experiences, and the richness and fun of training ensures patient compliance.

METHODS

Search strategy PubMed:
Disease: stroke
#1 ((((((((((((((((((((((((("Stroke"[Mesh]) OR (Strokes)) OR (Cerebrovascular Accident)) OR (Cerebrovascular Accidents)) OR (Cerebral Stroke)) OR (Cerebral Strokes)) OR (Stroke, Cerebral)) OR (Strokes, Cerebral)) OR (Cerebrovascular Apoplexy)) OR (Apoplexy, Cerebrovascular)) OR (Vascular Accident, Brain)) OR (Brain Vascular Accident)) OR (Brain Vascular Accidents)) OR (Vascular Accidents, Brain)) OR (Cerebrovascular Stroke)) OR (Cerebrovascular Strokes)) OR (Stroke, Cerebrovascular)) OR (Strokes, Cerebrovascular)) OR (Apoplexy)) OR (CVA (Cerebrovascular Accident))) OR (CVAs (Cerebrovascular Accident))) OR (Stroke, Acute)) OR (Acute Stroke)) OR (Acute Strokes)) OR (Strokes, Acute)) OR (Cerebrovascular Accident, Acute)) OR (Acute Cerebrovascular Accident)) OR (Acute Cerebrovascular Accidents)) OR (Cerebrovascular Accidents, Acute)
Intervention:VR
#2 (((((((Virtual Reality Exposure Therapy[Mesh]) OR (Virtual Reality Immersion Therapy)) OR (Virtual Reality Therapy)) OR (Reality Therapies, Virtual)) OR (Reality Therapy, Virtual)) OR (Therapies, Virtual Reality)) OR (Therapy, Virtual Reality)) OR (Virtual Reality Therapies)
#3 #1 AND #2
Cochrane Library
Disease: stroke
#1 MeSH descriptor: [Stroke] explode all tress
#2 (Strokes) OR (Cerebrovascular Accident) OR (Cerebrovascular Accidents) OR (Cerebral Stroke) OR (Cerebral Strokes) OR (Stroke, Cerebral) OR (Strokes, Cerebral) OR (Cerebrovascular Apoplexy) OR (Apoplexy, Cerebrovascular) OR (Vascular Accident, Brain) OR (Brain Vascular Accident) OR (Brain Vascular Accidents) OR (Vascular Accidents, Brain) OR (Cerebrovascular Stroke) OR (Cerebrovascular Strokes) OR (Stroke, Cerebrovascular) OR (Strokes, Cerebrovascular) OR (Apoplexy) OR (CVA (Cerebrovascular Accident)) OR (CVAs (Cerebrovascular Accident)) OR (Stroke, Acute) OR (Acute Stroke) OR (Acute Strokes) OR (Strokes, Acute) OR (Cerebrovascular Accident, Acute) OR (Acute Cerebrovascular Accident) OR (Acute Cerebrovascular Accidents) OR (Cerebrovascular Accidents, Acute):ti,ab,kw
#3 #1 OR #2
#4 MeSH descriptor: [Virtual Reality Exposure Therapy] explode all trees
#5 (Virtual Reality Immersion Therapy) OR (Virtual Reality Therapy) OR (Reality Therapies, Virtual) OR (Reality Therapy, Virtual) OR (Therapies, Virtual Reality) OR (Therapy, Virtual Reality) OR (Virtual Reality Therapies) :ti,ab,kw
#6 #4 OR #5
#7 #3 AND #6

Web of science
Disease: stroke
(TS=(Stroke)) OR TS=((Strokes) OR (Cerebrovascular Accident) OR (Cerebrovascular Accidents) OR (Cerebral Stroke) OR (Cerebral Strokes) OR (Stroke, Cerebral) OR (Strokes, Cerebral) OR (Cerebrovascular Apoplexy) OR (Apoplexy, Cerebrovascular) OR (Vascular Accident, Brain) OR (Brain Vascular Accident) OR (Brain Vascular Accidents) OR (Vascular Accidents, Brain) OR (Cerebrovascular Stroke) OR (Cerebrovascular Strokes) OR (Stroke, Cerebrovascular) OR (Strokes, Cerebrovascular) OR (Apoplexy) OR (CVA (Cerebrovascular Accident)) OR (CVAs (Cerebrovascular Accident)) OR (Stroke, Acute) OR (Acute Stroke) OR (Acute Strokes) OR (Strokes, Acute) OR (Cerebrovascular Accident, Acute) OR (Acute Cerebrovascular Accident) OR (Acute Cerebrovascular Accidents) OR (Cerebrovascular Accidents, Acute))
(TS=(Virtual Reality Exposure Therapy)) OR TS=((Virtual Reality Immersion Therapy) OR (Virtual Reality Therapy) OR (Reality Therapies, Virtual) OR (Reality Therapy, Virtual) OR (Therapies, Virtual Reality) OR (Therapy, Virtual Reality) OR (Virtual Reality Therapies))
#1 AND #2
Computer search China national knowledge infrastructure (CNKI), WanFang Database (WanFang Database) WANFANG, VIP, PubMed, Embase, Web of Science and Cochrane Library databases,the search period is from June 21, 2024.

Participant or population Patients with recent or past stroke.

Intervention The experimental group used virtual reality technology alone or in combination.

Comparator The control group used conventional rehabilitation therapy or related treatment.

Study designs to be included Randomized controlled trial, RCT.

Eligibility criteria Inclusion criteria: Observation indicators: overall cognitive function and each cognitive domain, negative emotion, etc. Exclusion criteria: Duplicate references in each database; Review, research progress, meta-analysis, conference papers; Documents inconsistent with the research theme and content; Literature where the data of the article cannot be obtained or there are logical errors.

Information sources Computer search China national knowledge infrastructure (CNKI), WanFang Database (WanFang Database) WANFANG, VIP, PubMed, Embase, Web of Science and Cochrane Library databases,the search period is from June 21, 2024.

Main outcome(s) Patient cognitive function related indicators: The Montreal cognitive assessment Scale (MOCA), Mini-mental status examination (MMSE), Loewenstein Occupational Therapy Cognitive Assessment (LOTCA); Indicators related to memory ability: Rivermead behavioral Memory test-second edition (RBMT-2); Related indicators of patient attention: Trail making test A/B (MTT-A /B); Patient perception related indicators: the perception dimension of Loewenstein Occupational Therapy Cognitive Assessment (LOTCA); Patients' visual spatial correlation index; Motor-free visual perception test-3 (MVPT3); Patient negative emotion related indicators: Hamilton Depression Rating Scale (HAMD); Hamilton Anxiety Rating Scale (HAMA).

Data management Use EndNote software for document management.

Quality assessment / Risk of bias analysis 2 was used to evaluate heterogeneity. When I2≤50% and P≥0.1, fixed effect model was used. When I2>50% and P75% and P<0.1, the source of heterogeneity was further analyzed by one-by-one screening method. Egger's test and Begg's test were used to evaluate publication bias.

Strategy of data synthesis Stata17.0 software was used to conduct meta-analysis of the scores of each scale after intervention. The results of each scale were expressed as Mean±SD. If some studies only reported the median, quartile, etc., McGrath et al. 's method was used for data conversion. mean difference (MD) or standard mean difference (SMD) were used as statistics for effect analysis, and each effect size was presented with its 95% confidence interval (CI).

Subgroup analysis 1. Immersive or non-immersive VR; 2. Course of treatment (2 weeks, less than 1 month, more than 1 month less than 2 months, more than 2 months) 3.VR perspective is first person or third person perspective.

Sensitivity analysis Sensitivity analysis was carried out by one-by-one elimination method.

Language restriction Only Chinese or English.

Country(ies) involved Medicine school of Yan'an University, Yan 'an 716000, China Medicine school of, Tianjin University, Tianjin 300000.

Keywords Virtual reality; Stroke; Cognition; Emotion; meta-analysis.

Contributions of each author

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