Original Article

The Effects of Virtual Reality on Burden, Quality of Life and Satisfaction in Informal Caregivers of Stroke Survivors

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ABSTRACT

Objective: To determine the effects of virtual reality on burden, quality of life and satisfaction in informal caregivers of stroke survivors.

Study Design: Randomized control trial study

Place and Duration of Study: This study was conducted at the Rawal General Hospital Rawalpindi from Aug 2020 to March 2021 for a period of six months.

Materials and Methods: A Total of 66 participants were included divided into three groups, Group A had undergone virtual reality therapy using Kinect (XBOX360) while playing the game Kinect adventure. The participants of Group B undergo cognitive Behavioral Therapy. The participants of group C were provided with both CBT and VR training. Assessments were taken at baseline and after 4 weeks using tools as The Caregiver Strain İndex, 36-Item Short Form Health Survey and the Adult carer questionnaire. Data analysis was done through SPSS-21.

Results: Analysis show significant effects of virtual reality on burden, quality of life and satisfaction in informal caregivers of stroke survivors for within group analysis and between group analysis with p value <0.05.

Conclusion: It is concluded that VR&CBT combined is effective in improving quality of life reducing caregiver's burden and increasing satisfaction.

Key Words: Cognitive Behavioral Therapy, Quality of Life, Virtual Reality

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INTRODUCTION

Stroke, or a Cerebrovascular accident (CVA) is a neurological dysfunction that often renders patients with different levels of disability which in turn need inpatient treatment along with prolonged care at home for complete function and recovery.[1] A stroke attack occurs as a result of interruption of blood supply and oxygen to the brain cells for a period of time can result brain cell death in the affected area. Stroke can result in the development of symptoms such as sudden, severe headache, loss of balance, slurring of speech, drooping of eyelids or mouth paresis or paralysis of the affected side, difficulty in comprehending and articulating speech sudden blurring or loss of vision.

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Therefore, the caregivers are put under the pressure to handle multiple responsibilities resulting in burden, especially when the needs of the caregivers are ineffectively addressed during the recovery phase of the patient. Stroke can often result in severe and long-lasting disabilities, especially in older people. This manifestation can result in loss of independence and the impending need for long-term care either at home or even in a nursing home depending upon the extent of disability or post stroke manifestations. Major disability may always involve impairment of several functions i.e. more than one for example, diminished power in the right side is very common .Moreover some of these limitations which may be seen in patients with stroke are due to poor motor control, muscle weakness and soft tissue tightening, sensory disturbances and balance disturbances, etc.[2] These conditions are particularly increasing the risk of falls for the patients. Weakness/ paresis could be considered the most prevalent impairments during the early stages post stroke as they result in disuse atrophy of limbs. Chronic pain, immobility and some other sensory impairments can also result in the above-mentioned atrophy state.[3] Symptoms can be ranging from varying degrees of minor weakness to a severe weakness/paresis or in the most severe cases of all consequently paralysis of one side of the body[4]. Depression is also a very frequent

disorder for post stroke patients. It often develops as a result of biochemical alterations of the brain. When the brain is damaged, the stroke victim may not be able to feel or sense positive or good emotions. Depression can also be a result of normal psychological reaction due to losses or disabilities caused by the stroke. The stroke survivors not only experience physically degrading changes, but many people experience changes in personality ranging from minor disturbances such as apathy to even total neglect.[5]

The demands of caregiving can result in a decrease in leisure time, socializing, adequate time for sleep, and mental relaxation for informal caregivers. It also affects their work lives due to decrease in working hours as to look after the patient, or even resignation due to poor work performance or overwhelming work burden, o ultimately in an early retirement. An increase in expenses due to the patient care including medications etc. and a decrease of the income of caregivers have also been reported in the 12-15 months post hospital discharge. It can also be due to the raise in care related expenses. In addition to that, factors such as prolonged time of care, or having higher levels of closeness or intimacy with the stroke survivor, physical disabilities and the costs to compensate for those changes, cognitive changes, and behavioral disturbances of the patient, diminished mobility, dependency for ADLs results in immense pressure and burden for the caregivers. There are many cases where caregivers have reached to the denial phase because of their dreadful experiences.[6] Stress coping strategies may include Virtual Reality (VR), Physical Exercise (P.E) and CBT (Cognitive Behavioral Therapy)

Virtual reality is the use of equipment to create virtual surroundings that make the user the feel of being absorbed in it. These atmospheres (3D designs or real videos) are multisensory (visual and auditory) and are produced by us with the purpose of treating changed psychosomatic pathologies.

The idea is to make a logic of being there: that the patient senses the identical emotions and has the similar feelings and responses that he would have in real life [7]. Cognitive behavioral therapy is a psycho-social intervention that aims to improve mental health. CBT focuses on challenging and changing unhelpful cognitive distortions and behaviors, improving emotional regulation and the development of personal coping strategies that target solving current problem. As per APA only 8-10 sessions are enough to create a significant improvement in patients.[8] Stroke survivors becoming disabled partially or completely, creates a high level of burden among caregivers. This burden gradually produces a negative effect on life of caregivers. In accessible literature very few researches have been conducted on this topic and none have been conducted on the effectiveness of VR on post stroke's informal caregiver's burden, QoL and satisfaction collectively. This study helps to determine the effect of usage of accessory tools such as virtual reality in eradication of caregiver's, burden or in satisfaction and improvement of quality of life.

MATERIALS AND METHODS

The study had approval from the Research Ethical Committee with REC.no: 00753 of Riphah International University and registered with IRCT20211123053152N1. Sixty-six participants were recruited with their consent and divided them into three groups A, B & C randomization. Randomization was done through sealed envelope method. Caregivers were recruited, from Physiotherapy department of Rawal General Hospital, of both genders aged between 20 to 40 years, taking care of patients for more than 3 months and having caregiver strain index above 7. Caregivers who were no longer primary caregiver or taking care of more than one patient or were suffering from any neurological or orthopedic disorder were excluded. We had also used blinding assessor process. We had accessed the participants prior to intervention in 1st weeks and after the intervention in 4th week to see the difference. Intervention was done for 4 weeks with 3 days every week. The participants of Group A had undergone virtual reality therapy using Kinect (XBOX360) while playing the game Kinect adventure. The procedures were explained to the subjects, and a demonstration of games was given by the therapist before starting the intervention. The intervention goes on for 4 consecutive weeks. The subject plays the game for 25 to 30 minutes for 3 times in a week. The participants of Group B undergo the Psychotherapy using Cognitive Behavioral therapy. Caregiver takes the CBT from the Psychologist for 25 to 30min per day for 3 times a week for a full month. The participants of group C were provided with both CBT and VR training for hour, 3 times in a week for a month. Total of 87 caregivers were assessed for eligibility. 11 were excluded in which 5 were not meeting the inclusion criteria and 6 declined to participate. 66 Caregivers participated in this research in which 48 were given intervention. We had also used blinding assessor process. We had accessed the participants prior to intervention in 1st weeks and after the intervention in 4th week to see the difference. Intervention was done for 4 weeks with 3 days every week.

The IBM SPSS 21 version was used for all statistical analysis. Normality test was applied on General health, limitation of activities, physical health problem, emotional health problem, social activities, pain, energy and emotion, social activities, Adult carer QOL and CSI. Non-parametric test was applied on the data because the p-value was <0.05. Non-Parametric; Wilcoxon signed rank test was applied for within group analysis. Kruskal Willis test was used for comparison of all three.

RESULTS

The mean age of GPA(VR)was 29.91±5.51, GPB(CBT) was 29.8±4.8 and GPC(VRCBT) was 29.8±4.58. Among total individuals, 26(27.3) were females and 22(22.7) were males. There were 15(18.2) caregivers who were taking care for the patient for 3 months, 12(8.3) for 4-6 months and 21(23.5) caregivers were taking care for 6-1 years. CSI frequency of Group A VR is 19(14.2) and in Group B CBT is 13(6.2) and VRCBT is 16(10.3).

Wilcoxon Sign Rank test was used for within group Analysis. General health, limitation of activities, physical health problem, emotional health problem, social activities, pain, energy and emotion, social activities, Adult carer QoL and CSI and it shows significant effect with p value <0.05. Kruskal Willis test was used for between group Analysis and it shows significant effect with p value <0.05.

Table No.1: Wilcoxon Sign Rank between groups Analysis

Variables		(VR GROUP A) MR	(CBT GROUP B) MR	(VRCBT GROUPC) MR	P value
General Health	Pre-Test	10.74	8.50	10.12	0.00
	Post Test	8.50	7.20	8.91	
Limitation of activities	Pre-Test	10.74	9.22	12.70	0.00
	Post test	8.22	8.50	10.32	
Emotional health problems	Pre test	9.50	8.25	9.23	0.00
	Post test	8.21	6.41	7.11	
Social activities	Pre test	9.50	8.25	9.23	0.00
	Post test	7.21	6.41	7.11	
Pain	Pre test	10.1	7.5	11.2	0.00
	Post test	8.3	6.41	9.5	
Energy and emotion	Pre test	10.4	9.4	12.1	0.00
	Post test	7.3	7.41	10.6	
Adult carer QoL	Pre test	9.50	6.23	9.23	0.00
	Post test	7.21	5.4	6.11	
CSI	Pre-Test	8.50	9.25	11.23	0.00
	Post test	5.1	7.41	8.50	

Table 2: Kruskal Wallis test for within group Analysis

Variables		(VR GROUP A) MR	(CBT GROUP B) MR	(VRCBT GROUP C) MR	P value
General Health	Pre-Test	35.4	34.2	30.8	0.661
	Post Test	32.8	33.6	22.0	0.00
Limitation of activities	Pre-Test	32.5	32.5	35.5	0.508
	Post test	30.0	29.2	23.5	0.00
Emotional health problems	Pre test	32.5	33.5	35.5	0.775
	Post test	22.5	22.5	20.5	0.000
Social activities	Pre test	33.5	33.5	33.5	0.563
	Post test	31.5	32.2	29.6	0.001
Pain	Pre test	31.5	35.1	33.8	0.691
	Post test	23.5	21.5	22.5	0.000
Energy and emotion	Pre test	30.9	34.2	35.3	0.787
	Post test	23.5	21.5	22.5	0.000
Adult carer QoL	Pre test	32.4	33.3	34.6	0.617
	Post test	27.4	29.3	21.6	0.001
CSI	Pre-Test	31.0	34.0	35.4	0.991
	Post test	21.5	22.0	21.0	0.045

DISCUSSION

The goal of present study was to inspect the effects of VR and CBT in caregivers of chronic stroke patients. The current study data specifies that VR and CBT is effectual to increase QoL, caregiver burden and contentment. All subjects with better caregiver burden at pretest has shown better progress after following VR and CBT. Present study stipulates that there was statistically substantial results after attentive treatment

with VR and CBT. In existing study, caregivers burden shown individual getting VR and CBT following 4-week exercise program presented noteworthy development in burden which is also reinforced by study carried by Gianluca Pucciarelli et al (2017) displayed that QOL in stroke caregivers did not meaningfully alter: (9).Though our study presented momentous development in QoL of caregiver with VR and CBT. Another randomized comparative study led by Ann-Cathrin Jönsson et al (2005) scrutinized variations of quality of life (QoL) covering physical and psychological features of stroke survivors and their informal caregivers. QoL of 304 successive stroke patients and their 234 informal caregivers were measured 4 months after stroke onset. SF-36 was continual for both groups after 16 months the patients' mean QoL scores enhanced between 4 and 16 months after stroke in the socio-emotional and psychological SF-36 areas and reduced in the area of physical function while our study's outcome exhibited important development in QoL by examining numerous aspects of QoL by SF 36.[10] In current study, burden of family members or caregivers and QoL were suggestively associated, a study directed by Camila Caminha et al 2018 showed that no substantial associations amid burden and quality of life, and variables in the emotional and societal spheres, age of caregivers, or care period [11]. Moreover, Eva M. Wijma et al worked on virtual reality involvement to improve acceptance and empathy for people with dementia in informal caregivers showed TDL(a form of VR) could support informal caregivers in their caregiving role: [12] A study in 2016 by Linda Helena Jütten et al on testing the effectivity of the mixed virtual reality training into dementia for informal caregivers of people with dementia and the consequence of both these studies were dependable with the effects of VR on stroke patients, in our research[13]. A study by Losada Andrés (2015) on Cognitive–behavioral therapy (CBT) for dementia family caregivers with depressive symptoms presented that substantial variations at post involvement were established in leisure and dysfunctional thoughts after CBT. Our study displayed similar outcomes afterwards cognitive rehabilitation.[14] Montse Romero Mas et al (2020), an article was published on Designing virtual communities of practice for informal caregivers of Alzheimer's patients. Virtual reality intervention was proved to be beneficial in promoting understanding and reducing burden on caregivers of Alzheimer's patients:[15] Milicia Petrovich and Andrea Gaggioli(2020), an article published in Front Public Health written on the effectiveness of digital mental health tools i.e. VR for caregivers (informal) of older adults. Caregivers reported that digital mental health tools such as V.R etc. have an overall positive impact on their health. Skills such as coping skills, emotion regulation and physical skill building were greatly enhanced.

CONCLUSION

In conclusion, stroke survivors as they become disabled partially or completely, creates a high level of burden among caregivers. This burden gradually produces a negative effect on of life of caregivers. So, the VR and CBT used combined has significant effect to eradicate burden, improve quality of life and increase satisfactions in informal caregivers of stroke survivors.

Author's Contribution:

Concept & Design of Study:	Marrium Batool
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