Effect of Video-Based Rehabilitation as an Adjunct to Physiotherapy in Post Stroke Patients

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Abstract

Objectives: Objective of this study was to evaluate the effects of video-based rehabilitation along with physiotherapy in improving the activities of daily living in stroke patients and evaluating its effects on spasticity.

Methodology: There were total 37 subjects, out of which 30 stroke patients were the participants of the study. This was a study to evaluate the effects of video-based rehabilitation along with physiotherapy in stroke patients. Here patients were evaluated on the basis of Modified Ashworth Scale and Modified Barthel Index before the treatment. Patients were showed videos of activities of daily living for 3 minutes every day after their physiotherapy session for 12 weeks and were assessed daily. At the end of the last session the patients were reassessed and re-evaluated on the basis of the same scales.

Result: There is a significant change in performing the activities of daily living and spasticity of the patients after 12 weeks of treatment compared to before treatment

Conclusion: Activity of daily living can be performed better with the help of videos, and daily physiotherapy sessions, video-based rehabilitation and physiotherapy also has an impact on reducing spasticity in stroke patients.

Keywords: *action observation therapy, video-based rehabilitation, physiotherapy, stroke, activities of daily living, spasticity, Modified Ashworth scale, Modified Barthel Index*

Introduction

The World Health Organization definition of stroke is," rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than of vascular origin"[7]

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The high incidence and severity of stroke outcomes are so shocking that this disease is considered to be the third common cause of death after cancer and cardiac problems. It is the most common cause of disability in adults.[8]

Motor deficits are characterized by paralysis or weakness, typically on the side of body opposite the lesion.[7]

women have a lower age-adjusted stroke incidence than men. However, this is reversed in older age.[7] incidence of stroke increases dramatically with age.[7]

Major risk factors of stroke are, hypertension, heart disease, disorders of heart rhythm, diabetes mellitus, cholesterol.

Tone- flaccidity is present immediately after stroke.[7] spasticity emerges in about 90% of vases and occurs on the side of the body opposite the lesion.

In stroke patients, upper extremity spasticity is frequently strong in scapular retractors, shoulder adductors, depressors, and internal rotators; elbow flexors and forearm pronators; wrist and finger flexors. In the neck and trunk, spasticity may cause increased lateral flexion to the hemiplegic side.

In lower extremity, spasticity is strong in pelvic retractors, hip adductors and internal rotators, hip and knee extensors, plantar flexors and supinator and toe flexors. Spasticity results in tight muscles that restrict movement.

It causes physical problems like hypertonicity which has an influence on patient's functional capacity causing problems in performing activities of daily living.[8] Stroke is an important cause of hemiplegia which causes severe disabilities in hand functions. [1,2] It is very important to find a therapy that makes the patient functionally independent. Video based rehabilitation works on the principle of action observation therapy. Action observation is a dynamic state where the observer understands what is shown in the video by initiating the actions[3]. The action observation therapy has two phases, the observation phase and the execution phase, thus allowing the patients to safely practice what is shown in the video.[4] This technique promotes functional reorganization within the brain by activating mirror neurons.[5] It also recovers damaged cerebral networks and rebuilds motor function when complemented to physiotherapy[6]. The goal of this therapy is to promote functional reorganization within the brain of stroke patients via activation of these mirror neurons in order to promote function recovery.[5] Mirror neurons are a unique set of neurons that represent an "observation-execution matching mechanism" which unites the sensing and implementation of an action.[7,9]

The aim of this therapy is to make use of this mechanism for the rehabilitation of stroke patients in performing activities of daily living.

Methodology

An approval for the study was obtained from protocol committee and institutional ethical committee of KIMSDU. Total 37 stroke patients were approached from Krishna Hospital, Karad, Maharashtra out of which 30 stroke patients were selected for the study who fulfilled inclusion criteria. The procedure was explained and consent was taken from those willing to participate. The patients were assessed on the basis of Modified Ashworth Scale and Modified Barthel Index, after their physiotherapy treatment, they were be made to sit in a comfortable place and a video of functional activity was shown, the patient was then asked to observe the task carefully first and after the video was stopped, they were asked to perform the same activity. The task became more complex as and how an activity was achieved. After the therapy concluded, the patients will be were re-assessed. Both the results were compared and statistically analysed.

Result

Table No. 1 Modified Barthel Index (Activity Of Daily Living)

	Mean±Sd	**P Value**	**Interference**
BEFORE TREATMENT	13.533±2.145		
		<0.0001	EXTREMLY SIGNIFICANT.
AFTER TREATMENT	16.767±2.029		

INTERPRETATION: The above table shows comparison of variables of modified Barthel index scale before and after treatment, with the p value <0.0001 which is statistically extremely significant. There is 23.89% increase in scores.

Table no. 2 MODIFIED ASHWORTH SCALE (SPASTICITY)

	MEAN±SD	P VALUE	INTERFERENCE
BEFORE	2.467±0.5074		
		<0.0001	EXTREMLY SIGNIFICANT.
AFTER	1.7±0.7022		

INTERPRETATION: The above table shows comparison of variables of Modified Ashworth Scale before and after treatment, with the p value <0.0001 which is statistically extremely significant. There is 31% reduction in scores.

Table no. 3 MODIFIED BARTHEL INDEX- MALE

MALES	BEFORE	AFTER
MEAN±SD	13.000±2.196	16.111
P VALUE	<0.0001	<0.0001
INTERFERENCE	EXTREMLY SIGNIFICANT	EXTREMLY SIGNIFICANT

INTERPRETATION: The above table shows comparison of variables of modified Barthel index scale of males before and after treatment, with the p value <0.0001 which is statistically extremely significant. There is 23.93% increase in scores.

Table no. 4 MODIFIED BARTHEL INDEX- FEMALES

FEMALES	BEFORE	AFTER
MEAN±SD	14.333±1.875	17.750±1.545
P VALUE	<0.0001	<0.0001
INTERFERENCE	EXTREMLY SIGNIFICANT	EXTREMLY SIGNIFICANT

INTERPRETATION: The above table shows comparison of variables of modified Barthel index scale of females before and after treatment, with the p value <0.0001 which is statistically extremely significant. There is 23.84% increase in scores.

Table no. 5 MODIFIED ASHWORTH SCALE- MALES

MALES	BEFORE	AFTER
MEAN±SD	2.444±0.5113	1.778±0.7321
P VALUE	<0.0001	<0.0001
INTERFERENCE	EXTREMLY SIGNIFICANT	EXTREMLY SIGNIFICANT

INTERPRETATION: The above table shows comparison of variables of Modified Ashworth Scale of males before and after treatment, with the p value <0.0001 which is statistically extremely significant. There is 27.25% reduction in scores.

Table no. 6 MODIFIED ASHWORTH SCALE- FEMALES

FEMALES	BEFORE	AFTER
MEAN±SD	2.500±0.5222	1.583±0.6686
P VALUE	<0.0001	<0.0001
INTERFERENCE	EXTREMLY SIGNIFICANT	EXTREMLY SIGNIFICANT

INTERPRETATION: The above table shows comparison of variables of Modified Ashworth Scale of females before and after treatment, with the p value <0.0001 which is statistically extremely significant. There is 36.68% reduction in scores.

Discussion

Stroke is one of the major leading causes of functional impairments that affects the activities of daily living. Activities of daily living include all the minor and major activities performed in day to day life, from lifting tooth brush to applying paste on it. Spasticity of the limbs secondary to stroke causes limitations in performing these activities. The patient becomes functionally dependent. The main goal of a physiotherapist is to make their patient functionally independent. One of the many approaches of rehabilitation is video-based rehabilitation. It works on the principle of Action-Observation Therapy.

This research was undertaken with the aim to study and compare the effect of video-based rehabilitation along with physiotherapy in post-stroke patients on activities of daily living and spasticity.

30 post-stroke patients (18 males,12 females), age group 40-70 years approaching to OPD of Krishna College of Physiotherapy participated in the study. The patients were assessed on the basis of Modified Barthel Index for activities of daily living and Modified Ashworth Scale for spasticity.

After each patient's routine physiotherapy session, they were made to sit in an isolated room where a video of a simple task was played, the patient was first asked to observe the task for 2-3 minutes and perform the task when the video was stopped. Each task was shown for 3 days. The task got more complex on every new video. The tasks included activities of daily living like- lifting spoon and eating, opening water bottle, opening door, buttoning and unbuttoning shirt, combing, brushing, tying shoe laces.

Statistical analysis was done using paired 't' test within group and unpaired 't' test was applied to compare the results between two groups.

In the study pre-interventional Modified Barthel Index values were 13.533 ± 2.145, whereas the post-interventional values were 16.767 ± 2.029 ($p<0.0001$) the changes in the values showed statistically extremely significant. The post-intervention study shows 23.89% increase in score of Modified Barthel index (activities of daily living).

In the study pre-interventional Modified Ashworth Scale values were 2.467 ± 0.5074, whereas the post-interventional values were 1.7 ± 0.7022 ($p<0.0001$) the changes in the values showed statistically extremely significant. The post-intervention study shows 31% reduction in score of Modified Ashworth Scale (spasticity).

In the study gender-wise distribution of Modified Barthel Index, pre-interventional values of males were 13.000±2.196, whereas the post-interventional values were 16.111 ($p<0.0001$) the changes in the values showed extremely significant. The post-intervention study shows 23.93% increase in score of Modified Barthel index (activities of daily living).

In the study gender-wise distribution of Modified Barthel Index, pre-interventional values of females were 14.333±1.875, whereas the post-interventional values were 17.750±1.545 ($p<0.0001$) the changes in the values showed extremely significant. The post-intervention study shows 23.84% increase in score of Modified Barthel index (activities of daily living).

In the study gender-wise distribution of Modified Ashworth Scale, the pre-interventional values of males were 2.444±0.5113, whereas the post-interventional values were 1.778±0.7321 ($p<0.0001$) the changes in the values showed statistically extremely significant. The post-intervention study shows 27.25% reduction in score of Modified Ashworth Scale (spasticity).

In the study gender-wise distribution of Modified Ashworth Scale, the pre-interventional values of females were 2.500±0.5222, whereas the post-interventional values were 1.583±0.6686 ($p<0.0001$) the changes in the values showed statistically extremely significant. The post-intervention study shows 36.68% reduction in score of Modified Ashworth Scale (spasticity).

In above study, the treatment was divided in two phases, routine physiotherapy session followed by video-based rehabilitation session. This activated the mirror neuron cells in the brain. Physiotherapy session adjunct to video-based rehabilitation also reduced spasticity making it easier to perform the task shown in the video.

Therefore, action observation therapy along with physiotherapy benefited the stroke patients, both males and females. Statistically it was found that the results showed significant difference before and after 12 weeks of treatment.

Conclusion

On the basis of the results of the study, it can be concluded that, there is 23.89% increase in the overall score of modified Barthel index and 31% reduction in the overall score of Modified Ashworth Scale. Thus, concluding that, activities of daily living has improved and spasticity has decreased after treatment when compared to that of before treatment.

Conflicts of Interest: There were no conflicts of interest in this study

Ethical Clearance: Ethical clearance was taken from institutional committee of Krishna institute of medical sciences.

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