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Research Article

EFFECT OF TASK-ORIENTED I-ADL TRAINING ON FUNCTIONAL INDEPENDENCE AND CAREGIVER STRAIN IN STROKE PATIENTS: A RANDOMIZED CONTROLLED TRIAL

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Abstract:
A complicated malfunction brought on by a brain damage is known as a cerebrovascular accident or stroke. Paralysis of one side of the body is known as hemiplegia, which is caused by upper motor neuron failure following a stroke.
Methods: At Santosh College of Occupational Therapy in Ghaziabad, a randomized control trial investigation was carried out. Participants in the experimental group underwent structured task-oriented I-ADL training focusing on meaningful, goal-directed daily activities. The control group was given traditional rehabilitation exercises. Standardized outcome metrics were used to assess functional independence and caregiver strain at baseline and post-intervention.
Results: The current study's findings demonstrate that in the experimental group, more pronounced changes were observed as the Lawton IADL scores demonstrated a highly significant enhancement($t = -16.33$, $p < 0.001$). Similarly, MCSI scores showed a very notable decrease in caregiver burden ($t = 13.682$, $p < 0.001$). On the other hand, Lawton IADL scores improved statistically significantly within the control population ($t = -10.67$, $p < 0.001$). Additionally, control group for MCSI demonstrated a significant drop incaregiver strain ($t = 11.298$, $p < 0.001$).
Conclusion: The current study's findings demonstrate that while both groups showed improvement over time, the experimental group experienced significantly greater enhancement in functional independence and significant decrease in caregiver stress in contrast to the control group.
Keywords: Daily Living Activities; Neuro rehabilitation; Occupational Therapy; Stroke; Task-Oriented Training

1. Introduction

A complicated malfunction brought on by a brain damage is known as a cerebrovascular accident or stroke. According to the WHO, a stroke is "acute neurologic impairment from a vascular source with signs and symptoms that show the involvement of certain brain areas.".Hemiplegia, or paralysis of one limb, is caused by upper motor neuron failure following a stroke. side of the body, encompassing the trunk, limbs, and occasionally the face and oral regions that are located on the brain's other side on the hemisphere that has the damage. [1] Non movement based sign include cognitive impairment, dysautonomia, sleep disturbances, psychiatric manifestations, &sensory abnormalities. 39 million deaths, or 57% of the 68 million deaths that occurred globally in 2021, were attributed to the ten most prevalent causes of death. 10% of these cases were brought on by stroke. [2]The investigation on GBD shows the CVA resulted in 160.5 million Disability-Adjusted Life Years and over 7.3 million fatalities in 2021.Several low and middle income countries including India, accounted for 76.7% of global stroke prevalence in 2021. [3]

In India, the annual prevalence of stroke is between 119 and 145 per 100,000 people, with metropolitan areas having higher rates of stroke than rural ones.[4]

Upper-limb dysfunction following stroke manifests as a collection of motor and sensory deficits, including weakness, spasticity, impaired coordination, loss of dexterity, and sensory loss. [5]These impairments can severely restrict being able to carry out necessary duties like dressing, eating, grooming and writing, leading to dependence on caregivers and reduced the quality of life. Therefore, restoring upper limb function is among the main objectives of rehabilitation for stroke [6]

A potential rehabilitation strategy that places an emphasis on practicing functional tasks related to the patient's everyday life is called task-oriented training,

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or TOT. [7] TOT is established on the ideas of neuroplasticity and motor learning, promoting the reorganization of neural pathways and the acquisition of new motor skills through repetitive practice of goal-directed movements.[8] TOT interventions typically involve selecting tasks that are meaningful and challenging for the individual, providing feedback and guidance, and gradually increasing the difficulty of the tasks as the individual progresses.[9]

There are two categories of activities related to daily living: Daily Living activities also known as Instrumental Daily Living activities and PersonalDaily Living activities and BasicDaily Living activities. Daily living activities emphasize taking care of one's own body and call for basic abilities. ADLs include self-care activities like bathing and showering, managing one's bladder and bowels, putting on and taking off clothing,eating, swallowing, feeding, sexual activity, functional mobility, includingbed mobility as well as transfers, toilet cleanliness, and taking care of personal gadgetslike splints, orthotics and hearing aids.

IADLs demand increasingly sophisticated abilities across the board. Compared to ADLs, IADLs typically call for the utilization of social skills, executive processes, and more intricate contextual interactions.[10]

For stroke survivors, providing essential care is crucial to their recuperation, prevention of further strokes, and general health. [11] Taking care of someone with severe, long-term health issues can be challenging, especially for inexperienced primary caregivers. As could be expected, the constant mental and physical strain of providing care leads to a high rate of caregiver stress.[12]

The stress that comes with taking care of an elderly, disabled, or chronically ill family member is known as caregiver load. Increased drug use and health-risky behavior been linked to caregiver stress and burden. [13] It has been discovered that the state of their bodies, minds, and emotions of those who provide care for stroke survivors is negatively impactedto the long-range nature of stroke rehabilitation and the sudden onset of disability. Many of the family members had to quit their jobs, while others had to modify their work schedules. Primary caregivers for stroke victims frequently report greater rates of somatic and mental symptoms, sleep problems, social isolation and stress compared to the general populace [14]

2. Methodology

2.1 Outcome variable post-data analysis

Santosh College's Institutional Ethics Committeegave its approval to this study**(Ref. No.SCOT/July-25/ECNeuro-01)**and the information was acquired from the Ghaziabad community. Using simple randomized selection, according to inclusion and exclusion standards, 28 participants in total were chosenand Modified Barthel Index (MBI) was implemented in order toscreen them.

2.2 Participants

Eligible participants were adults with Hemiplegia caused by a stroke that happened six months ago and those score ranges from 61-90 in Modified Barthel Index. The exclusion criteria was adults who have trouble with thinking or memory, like those with dementia, and cannot understand instructions because of language issues or other problems and those who have serious joint tightening because of bone and joint problems in the shoulder, elbow, and wrist.

2.3 Intervention

Each session of the task-focused training program for the intervention group lasted roughly 45 minutes and included ADL activities like washing their faces, brushing their teeth, applying toothpaste, changing their upper and lower garments, making tea, cooking Maggie, Vermicelli, and Poha, washing dishes, ironing shirts on an ironing board, and managing E-ADL by an occupational therapist.

The control group was also given functional IADL activities like the clay, thread and beads, puzzle, and pegboard activities, as well as passive joint exercises likeradial and ulnar deviation, extension,flexion, adduction, abduction androtation of the internal and external shoulder, flexion and extension of elbow andwrist.

2.4 Outcome Measures

The Modified Caregiver Strain Index and Lawton-Brody IADL scale acting as screening tool, were the primary outcome measures.

2.5 Statistical Analysis

The informationwas analyzed using IBM Corp., USA's SPSS version 26.0. Data from the outcome measuresMCSI and Lawton IADL scalebefore as well as after the intervention were to assess the intervention's efficacy on improving functional independence and reducing caregiver burden among the participants. Statistical analysis was carried out using appropriate procedures to investigate variations and shifts between groups and changes following the intervention.

3. Results

The study included 28 individuals in all, and data was collected through the Modified Barthel Index screening test. 14 subjects were allocated to group 1 which was named Experimental group and 14 into group 2 named Control group. The results were evaluated by comparing the two groups' pre- and post-intervention scores.

- RKS oversaw the process and made significant revisions to the book. CK revised the manuscript&organised its submission. The final text was reviewed and approved by all authors.

- **Table 1.0: Demographic characteristics**

Characteristic	**Category**	**Control Group (n=14)**	**ExperimentGroup (n=14)**	**Total (N=26)**
Age (Years)	**51-60**	**3**	**1**	**4**
	61-70	**9**	**12**	**21**
	71-80	**2**	**1**	**3**
Gender	**Male**	**6**	**7**	**14**
	Female	**8**	**7**	**14**
Intervention		**Conventional occupational therapy program**	**Task oriented training program**	

- **Table 2.0: Descriptive Statistics of Outcome Measure**

Outcome Measure	**Category**	**Pre-test Mean**	**MeanPost-test**	**SDPre-test**	**Post-test SD**
Lawton IADL	Control	2.07	3.14	0.99	0.77
	Experiment	2.5	4.57	1.16	1.02
MCSI	Control	21.64	19.14	0.99	0.77
	Experiment	20.79	15.36	1.54	1.91

- **Table 3.0: Baseline Assessment Pre-Data Analysis**

Scale	**Control Group**	**Experiment Group**	**t Value**	**P Value**	**Inference**
PRE–Lawton IADL	Pre-test Lawton IADL	Pre-test Lawton IADL	-1.17	0.25	No statistically significant difference
PRE–Modified Caregiver Strain Index	Pre-test MCSI	Pre-test MCSI	2.79	0.131	No statistically significant difference

- **Table 4.0: Post-Data Evaluation**

Scale	**Control Group**	**Experiment Group**	**t Value**	**P Value**	**Inference**
POST–Lawton IADL	Post-test Lawton IADL	Post-test Lawton IADL	-3.62	0.001	Statistically significant difference
POST–Modified Caregiver Strain Index	Post-test MCSI	Post-test MCSI	6.24	<0.001	Statistically significant difference

- **Table 5.0: Paired Sample Test**

Group	**Pre-Post**	**95% Confidence Difference Interval**		t	Significance	
		LOWER	UPPER		One-sided p	Two-sided p
Control	PRE-LAWTON IADL SCALE - POST-LAWTON IADL SCALE	-1.46	-0.968	-10.67	<.001	<.001
	PRE-MCSI - POST-MCSI	2.08	3.063	11.298	<.001	<.001
Experiment	PRE-LAWTON IADL SCALE - POST-LAWTON IADL SCALE	-2.345	-1.797	-16.33	<.001	<.001
	PRE-MCSI - POST-MCSI	4.331	5.955	13.682	<.001	<.001

4. 4. Discussion

The study's findings offer solid evidence of the intervention's ability to improve functional independence and reduce caregiver stress. The reported improvements in MCSI and LawtonIADL are consistent withthe text of literature that demonstrates how structured therapy sessions can enhance daily functioning and lessen caregiver stress. The experiment group was compared to the control group in whichthe formerwas better in aspects of improvement, suggesting that the intervention went beyond standard or regular care.

The results of the present research provide strong evidence of the intervention's capacity to reduce caregiver stress. Similarly, Anand Kumar et al.'s study discovered that the majority of stroke survivors' caregivers endure exceptionally high levels of stress. Anand Kumar et al. examined a number of factors linked to stroke patients' greater caregiving dutiesby using the OCBS and CSI as outcome measures examine the connection between caregiver stress and the clinical and personal traits of the patient.

The majority of stroke survivors' caretakers face an unprecedented degree of stress, according to the study's findings. This emphasizes the importance of societal conventions and familial bonds, as well as the mental, physical, emotional, and financialexperienced by through a stroke. Spouses, sons and daughters, son-in-laws and daughter-in-laws, siblings, and other immediate family members provided care for the majority of patients, with 72% of caregivers being female. While some family members were required tochange their work hours, many were forced to resign from their employment due to their work hours.They concluded that the challenges faced by caregivers should also be addressed by stroke rehabilitation programs, such as through counseling sessions and instruction in practical nursing techniques, so as toreduce the strain on caregivers and promote the healing of patients. Caregiver stress vs. stroke burden planned investigations utilizing a predetermined process at multiple sites must be conducted in order to determine the local condition and gain some general planning.[15]

This current study's results offer clear evidence of the intervention's efficacy in enhancing functional independence. In similar fashion, Khader A. Task-oriented training seems to be a successful upper extremity post-stroke rehabilitation strategy that produces clinically significant functional improvement, according to Almhdawi et al.Task-oriented training seems to be an efficientupper extremity rehabilitation strategyfollowing a strokethat produces clinically significant functional improvement, according to Khader A. Almhdawi et al.WMFT, MAL and COPM were employed as measures for outcomes. They assessed strength of handheld dynamometry andupper extremityactive range of motion.

The study's findings demonstrated that individuals whopreferred task-oriented activities reported significantly higher increases in self-perceived degree of satisfaction and performance as assessed by COPMfor the top-priority functional tasks. Additionally, as measured by MAL, The self-perceived rating of quantity and quality of upper extremity usage in daily functional activity is much higher for task-oriented tasks.Lastly, the WMFT time scale showed that participants were considerably quicker after the task-oriented tasks when using the afflicted upper extremity functionally. [16]

5. Conclusion

This study demonstrates that although both the experimental and control groups made progress over time, the experimental group's gains in functional independence and decrease in caregiver stress were were noticeably greater than the control group. These results show how effectively the intervention enhances patient outcomes and reduces caregiver stress.

DECLARATIONS

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- **Authors' Contributions:**PS designed the study, created the procedure, collected the data, and wrote the initial manuscript draft. RKS directed the process and significantly altered the book. AS edited the document and monitored submission. Every authors reviewed and accepted the finished product.
- **Ethical Approval and Consent:** Ethical Clearance: SCOT/July-25/ECNeuro-01. To take part in the intervention and have their data published, each study participant provided their informed consent.
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- **Data Availability Statement:**The datasets produced can be obtained from the designated author and and examined for this study upon proper request.
- **AI Disclosure:**This study's conception, implementation, data analysis, and manuscript drafting did not make use of artificial intelligence tools.

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