

Effect of Neurofunctional Approach on Instrumental Activities of Daily Living in Stroke Survivors

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Abstract:

Purpose: to know the effect of Neurofunctional Approach for improvement of Instrumental Activities of Daily Living skills in stroke survivors.

Methodology: a pre-test, post-test control design group was used followed by descriptive analysis. A total number of 30 subjects affected by stroke were selected for the study. Mean age was 48 years (age range 40 to 57 years) having male only. The outcome measures used for the study were Lawton Brody Instrumental Activities of Daily Living.

Result: the result and the analysis shows significant improvement ($p \leq 0.05$) that there is significant improvement in Instrumental Activities of Daily Living Skills within 4 weeks through NeuroFunctional Approach.

Conclusion: Neurofunctional approach is useful for training in instrumental activities of daily living. However the training should be goal directed task and depend upon the areas where participants having difficulty in doing instrumental activities.

Keywords: Neurofunctional Approach, Instrumental Activities of Daily Living (IADL), stroke

INTRODUCTION:

Stroke is one of the most common causes of severe disability[1]. The current World Health definition of stroke (introduced in 1970 and still used) is rapidly developing cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin. In addition to physical impairments there are often cognitive impairments, which act as barriers to function and social independence as well as affecting both patients and carers quality of life. Cognitive disturbances are frequent in patients with stroke causing significant disability[2]. Cognitive function and motivation are strong predictors of functional outcome in terms of activities of daily living (Sinyor 1986 and Grotto 1998) Kathleen et.al 1998) found that cognitive impairment can result in significant disability in all aspects of client life : self care; independent living skills; work; leisure; social and interpersonal skills[4]. The level of orientation influences basic ADL (BADL) and instrumental ADL (IADL) and social activities in acute as well as chronic stroke patients[4]. It is assumed that IADL require more complex neuropsychological processing capacity than BADL and therefore are prone to deterioration triggered by cognitive decline[3]. Few studies have addressed the recovery of Instrumental Activities of Daily Living such as home management, vocational, leisure, or community skills[5]. Approaches exist

in which there may be a closer match between what is trained and what the person has to do in his/her everyday life, such as domain-specific strategies and function embedded cognitive training[6].. These approaches can be conceptualized along a hierarchy of generalization or 'transfer distances' relating to the gap between the strategy or training task and activity that has to be undertaken in everyday life[6]. An approach that involves least amount of transfer in this hierarchy is the Neurofunctional Approach (NFA). The NFA is occupation-based focused on 'learning by doing' and occur within the clients' natural environment or as close to this environment as possible. It involves development of retraining programme designed to foster the development of habitual routines and automatic functional competencies in areas identified as important for the client[6].

Aim and Objective

To find out the effectiveness of neurofunctional approach for retraining of instrumental activities of daily living in stroke survivors.

To establish the best practices in retraining IADL based upon neurofunctional approach in improving Instrumental Activities of daily living in stroke patients.

Hypothesis

There is improvement of IADL skills in stroke patients through use of neurofunctional approach

Null Hypothesis

There is no improvement of IADL skills in stroke patients through neurofunctional approach

METHODOLOGY:

Design

The design of the study used was pre – test, post - test, control design group

Participants

- A total number of 30 stroke participants were selected for the study through convenient sampling
- All the subjects were recruited from the department of occupational therapy, SVNIRTAR, Cuttack, within the year of 2015
- Thereby stroke survivors those were meeting the inclusion were selected.

Inclusion criteria

Subjects with

- Cerebro –vascular- accident (CVA) both due to haemorrhage and infarction
- The age group was between 40-60.
- Only male participants
- Sub- acute and chronic stage participants were also included

Exclusion criteria

Subjects with

- CVA due to traumatic brain injury
- Brain tumors associated with CVA
- Infectious brain diseases like malaria and meningitis etc
- Identified orthopaedic problem (e.g osteoporosis, OA, RA, fracture and shoulder subluxation)

Outcome measure

Lawton Brody Instrumental Activities of Daily Living

Procedure

The participants were screened by MMSE (Mini Mental State Examination) and included into the study

group. The informed consent was signed from every patient in the study group. Then the patients were conveniently divided into 2 groups- one experimental group (15) and another one is control group (15). The Group 1 Participants received conventional therapy (controlled group) and the Group 2 Participants to received conventional therapy along with neurofunctional approach protocol on IADL (experimental group). The control group were receiving only conventional therapy per day, whereas the experimental group were receiving IADL training based on neurofunctional approach for duration of 1-1.5 hours along with regular occupational therapy per day. The experimental group had undergone treatment protocol for 5days/week for 4 weeks. Specific tasks were selected and patients having difficulty in any one or two or three tasks were given neurofunctional training as appropriate.

The preferred hand were used for tasks

- Using telephone
- Handling medication
- Money management

Protocol

Using phone to make calls

The participants were motivated to use phone and how they would ease their daily life. They were first made to answer calls. If they were able to answer calls but not able to make a call. Then difficulties causing this were realized. They were made orientated to numbers and alphabets. They were also helped to be oriented to few emergency and family member numbers – by labelling them and using them daily to revise. Memorising numbers by vocalization and repetition was then directed. Then recalling and dialling the memorized calls helped the patient to maintain the task. The task was graded by asking the patient to scan through phone book in order to find a given number to make a call. Feedback was given either verbally or in form of stars in chart after successful completion and on regular practicing.

Taking own medicines

Participants were motivated to take own medicines as this would reduce their dependence on others. Orientation to own pills by using colour coding in case patient has other family members taking medicines. Intake of pills using colour coding with timing by memory aid (following a given time table), which colour pills are to be taken in which time of the day. Memorising and recalling pills intake with reference to time but without colour coding were encouraged. They were asked to rehearse the same at home. Feedback was given verbally or in form of stars in chart after successful completion and regular intake independently.

Handling money

Participants were motivated to handle money by themselves and how they could help their family members in running errands. Difficulties in handling money were recognized and based on that the protocol was modified. If the participant had difficulty in orientation he was first made to orient to different coins and currency notes of various values. Operating simple money calculation was assessed and intervention was given accordingly. First he was asked to make small purchases (as listed) from nearby market with maximal assistance. This was then graded by making small purchases (as listed) from nearby market with minimal assistance, and then by making small purchases (as listed) from nearby market without assistance. Feedback was given either verbally or in form of stars in chart after successful completion and regular handling independently.

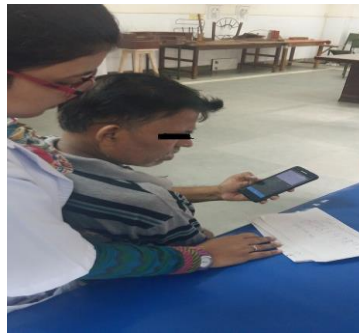


Figure 1: A participant trying to dial the number of his son by copying from the paper



Figure 2 : A participant is doing a small purchase with minimum assistance

Reinforcement stars

PATIENT NAME: XY

SAMPLE	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Week 1	*	*	*	*	No Performance	No Performance	*	*
Week 2	No Performance	*	No Performance	*	**	*	**	**
Week 3	**	**	*	**	**	*	**	**
Week 4	**	**	*	**	**	**	**	**

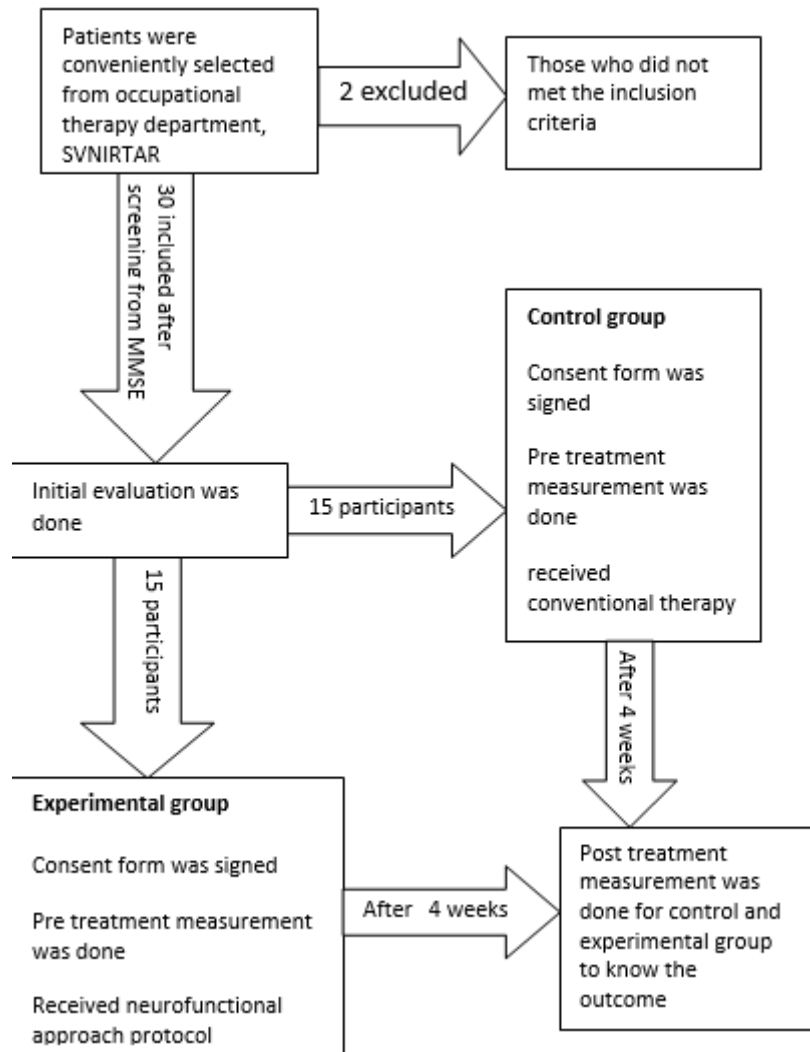
Excellent - ****
 V. Good - ***
 Good - **
 Fair - *
 Can do better -

Figure 3: Feedback given in form of stars in chart



Figure 4: Colour coding of the medicines

DATA COLLECTION DATA ANALYSIS



The data gathered as per the above procedure were tabulated in the master chart (Appendix VI). The test parameters were compared before and after the intervention. Statistical calculation was performed with SPSS version 23.0 package. Statistical tests were carried out with the level of significance set at $p \leq 0.05$. To know the difference in the study group Wilcoxon signed Rank test was used for within the group and Mann-whitney U test was used to know the difference in improvement between the two group.

RESULT

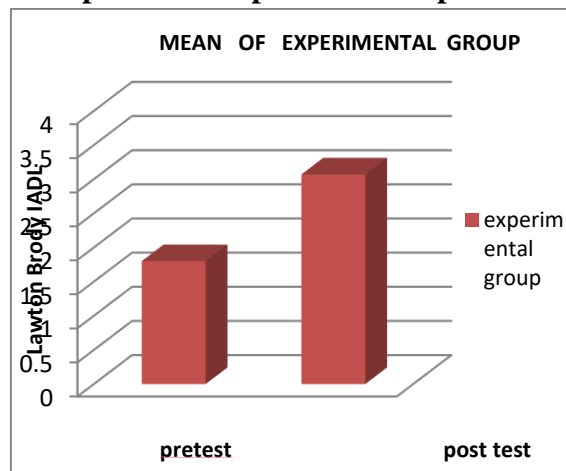
TABLE 1: Depicting minimum and maximum age of participants

	N	Minimum	Maximum	Mean	Std. Deviation
Age	30	40	57	48.40	6.038
	30				

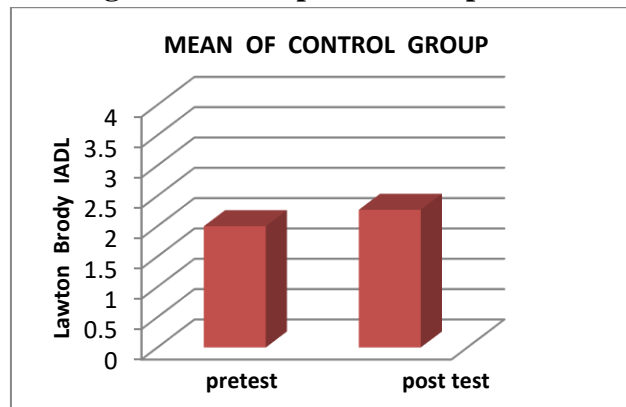
Table 2: Changes in pre and post test score of IADL in experimental and control group

group	variable	mean	Std. deviation	'z' value	Level of significance
experimental	Pre test	1.80	1.014	(-)3.272	0.001
	Post test	3.07	0.961		
control	Pre test	2.20	1.000	(-)2.000	0.046
	Post test	2.27	1.163		

GRAPH 1: Showing the mean of pre test and post test of experimental group



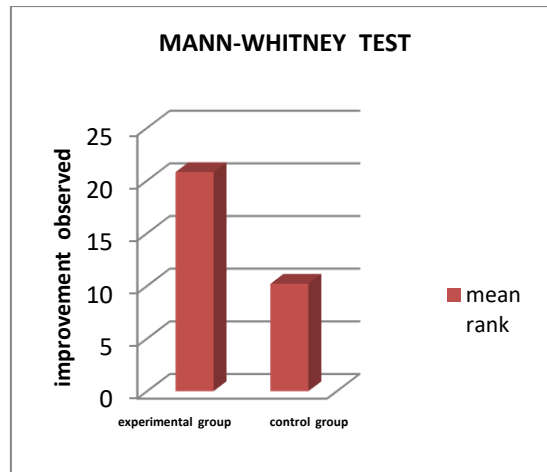
GRAPH 2: Showing the mean of pre test and post test of control group



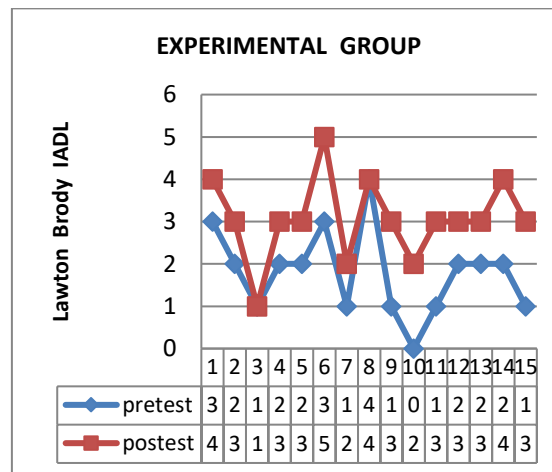
GRAPH 3: Showing the mean rank of experimental and control group

Table 3 :Mann Whitney U Test representing the mean of experimental and control group score

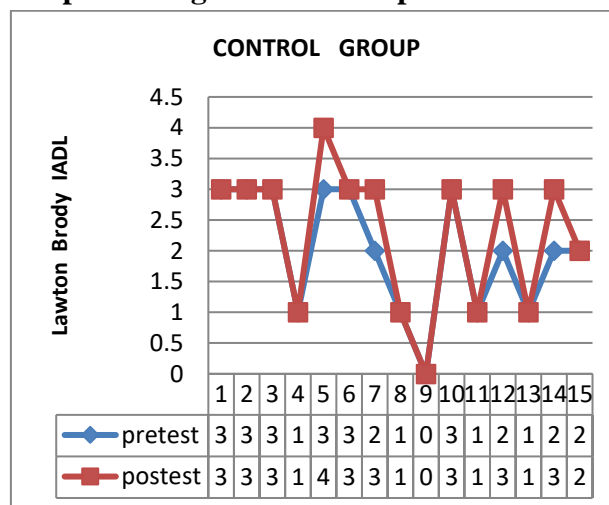
Group	N	Mean Rank	Sum of Rank
Experimental	15	20.80	312.00
Control	15	10.20	153.00
Total	30		



GRAPH 4 : Representing individual improvement in experimental group



GRAPH 5 : Representing individual improvement in control group



DISCUSSION

Glen Gillen mentioned studies from Sweden and Spain indicating that persons who have had stroke tend to attain independence in basic self care tasks to a greater degree than with IADL tasks. Instrumental activities of daily living require greater interaction with the physical and social environment and a

greater degree of skill (e.g. Problem solving and social skills) than basic self care tasks. Therefore any underlying impairments in a person's sensorimotor, cognitive-perceptual, or psychosocial capacity that may result from CVA tend to affect the performance of IADL tasks to a greater degree than they affect basic self care[7].

The critical issue regarding the presence of underlying impairments resulting from a CVA and the performance of IADL tasks is whether occupational therapy intervention for a disability in IADL performance should be focused directly on improving a patient's underlying impairments. If a person's IADL performance cannot be predicted from the degree of the impairment, changing a person's degree of impairment may not automatically improve IADL performance[7]. The neurofunctional approach stresses control on patient's total learning environment. It is not restricted to patients with one type of disorder or one level of severity in disturbance of function[8].

The participants who were included in this study had an age range as mentioned in table 4, with minimum age of 40 and maximum 57 were included in the study. In 2009 Sidharan et al from India found that incidence rates of stroke per 100 000 inhabitants per year for the urban community were 1.6 for ages 15-24, 10.1 for ages 25-34, 29.9 for ages 35-44 and 94.9 for ages 45-54[9].

Only male participant were included in this study as it was helpful in forming the goal. In 1998 Gims et al found that men find it harder to be independent in such activities as Washing, Cooking, and cleaning than women, whereas the opposite was true of Large- and Small-Scale Shopping and Locomotion Outdoors[10]. In this study, the mean rank of experimental group is 20.80 and control group being 10.20 as plotted in graph 3, table 3. This explains that participant receiving neurofunctional treatment progressed significantly $p \leq 0.05$ than those who did not receive it. Kenneth N. K. Fong and Dorothy R. Howie in 2009 also had metacomponential strategies with conventional cognitive training as an intervention strategy and for problem solving in patients with traumatic injury. In their study they noticed that patients receiving functional skill training using compensatory technique improved more than those receiving cognitive drilling as they were not able to transfer these benefits to real life situations[11].

The experimental group did improve significantly ($p=0.001$) with 13 participant indicative of increase in scores and 2 had same score in pre and post test as shown in graph 4. The mean score of pretest was 1.08 and post test being 3.07 as shown in table 2 and graph 1. After the neurofunctional treatment the minimum score is found 1 and the maximum increase in score was 5. Maximum individuals showed maximum of 1 increase in score from their pretest score. The individual did show improvement of score as same score is given for subsequent subtest for e.g. in shopping the subscore is 0 for subtest 2, 3 and 4. So as a result even if the patient improved from subtest 3 to 2 he's score remained 0. Sholmit Rotenberg-Shpigelman et al in 2012 also found that individuals in the chronic stage after stroke can set and attain occupational goals with relatively limited therapeutic resources[12]. Neurofunctional approach, an occupation based intervention, has been shown to be a feasible treatment option that can reduce disability and enhance participation of this growing population[8].

On the contrary when conventional therapy was given to individuals with no specific goals only 4 participants had shown improvement and 11 participants had the same score in pre and post test as shown in table 5. In 2010 Combs, S.A., Kelly et al found that task specific training was a feasible program for stroke survivors[13].

On plotting a graph with the mean score of control group in pre and post test (mean of pre = 2.00 and mean of post being 2.27 as shown in graph 2. No significant improvement was noticed with $p=0.046$. This

is indicative of that when treatment protocols used with specific goals like in this study handling own medicines, making phone calls and handling money were taken; will show more improvement in these tasks as compared to those protocols which had no specific goal oriented tasks. Neurofunctional approach taken as self care interventions by Hoen Keung Yuen in 1994 also had taken specific task of taking a shower, brushing teeth and shaving. Reinforcement is required after successful completion as he had reinforced the behaviour by giving a pepsi[14].

The reinforcement given in these cases were positive reinforcement such as applauses, or remarks.

Although the control group did attain cognitive therapy but transfer of cognitive implement in IADL tasks did not occur.

CONCLUSION

From the above study it can be concluded that neurofunctional approach is useful for training in instrumental activities of daily living. However the training should be goal directed task and depend upon the areas where participants having difficulty in doing instrumental activities. As neurofunctional approach is performed in its natural context where the task is needed to perform therefore it requires less amount of transfer and allows the participant to do the task more independently.

Assessment and intervention done through neurofunctional approach will help form realistic goal.

LIMITATIONS

- Small group size, thus it is difficult to generalize findings
- Population was confined
- Study duration was short

FUTURE RECOMMENDATIONS

- Large sample size with homogenous group can be taken
- Additional studies of long term can be done
- Comparisons of independence in IADL can be done between men and women

REFERENCES

1. M McKinney, H Blake, NB Lincoln, ED Playford and JRF Gladman; Evaluation of cognitive assessment in stroke rehabilitation; Clinical Rehabilitation 2002; 16; 129-136
2. S. Alladi, A.K. Meena, S. Kaul; Cognitive Rehabilitation in Stroke : Therapy and Techniques; Neurology India; Dec, 2002; Vol. 50; S102-S108
3. KatrinJekel, Marinella Damian, Carina Wattmo, LucreziaHausner, Roger Bullock; Mild cognitive impairments and deficits in instrumental activities of daily living : a systemic review; Alzheimer's Research and Therapy ; 2015; 20 pages
4. SP Mokashi, MOT; Relationship Between Cognitive Deficits And The Ability To Perform The Activities of Daily Living in Stroke Patients; The Indian Journal of Occupational Therapy; vol.XXXVII : No. 1 (April '05- July '05); 1-9
5. Catherine A. Trombly Latham, ScD, OTR/L, Mary Vining Radomski, M.A., OTR/L; Occupational Therapy for Physical Dysfunction; 6th edition

6. Jo Clark-Wilson, Gordon Muir Giles, & Doreen M. Baxter; Revisiting the neurofunctional approach: conceptualizing the core components for the rehabilitation of everyday living skills; *Brain Injury*, 2014; 28(13-14); 1646-1656
7. Glen Gillen, MPA, OTR/L, Ann Burkhardt; *Stroke Rehabilitation A Function-Based Approach*; 2nd edition
8. Gordon Muir Giles; Jo Clark Wilson; *Brain Injury Rehabilitation A Neurofunctional Approach*
9. Sapna E. Sridharan, MD; J.P. Unnikrishnan, MPhil; Sajith Sukumaran, MD; P.N. Sylaja, MD; S. Dinesh Nayak, MD; P. SankaraSarma, PhD; Kurupath Radhakrishnan, MD; Incidence, Types, Risk Factors, and Outcome of Stroke in a Developing Country The Trivandrum Stroke Registry; *Stroke*; April 2009; 1212-1218
10. Grimby G, Andr n E, Daving Y, Wright B; Dependence and perceived difficulty in daily activities in community-living stroke survivors 2 years after stroke: a study of instrumental structures; *Stroke*; 1998; sep 29(9); 1843-1849
11. Deirdre R Dawson, Nicole D Anderson, Malcolm A Binns, Carolina Bottari, Thecla Damianakis, Anne Hunt, Helene J Polatajko and Merrick Zwarenstein; Managing executive dysfunction following acquired brain injury and stroke using an ecologically valid rehabilitation approach: a study protocol for a randomized, controlled trial; *Trials*; 2013; 7 pages
12. Sholmit Rotenberg- Shipgelman, Asnat Bar- Haim Erez, Irit Nahaloni, and Adina Maeir; Neurofunctional treatment targeting participation among chronic stroke survivors : A pilot randomised controlled study; *Neuropsychological Rehabilitation*; iFirst, 1-18
13. Combs SA, Kelly SP, Barton R, Ivaska M, Nowak K; Effects of an intensive, task-specific rehabilitation program for individuals with chronic stroke: a case series; 2010; *Disability Rehabilitation*; 32(8); 669-678
14. Hon Keung Yuen, MS, OTR/L ; Neurofunctional Approach to Improvement Self-Care Skills in Adults with Brain Damage; *Occupational Therapy in Mental Health*; 1994; vol.12(4); 31-45