IJPMR 2009; 20 (1):19-22

Cognitive Rehabilitation in Stroke Cases

SK Pandey, S Iswarari, A Ballav, R Kumar, K Chakraborty, KM Das

Institute of Post-Graduate Medical Education and Research (IPGMER), Kolkata, India

Abstract

In the conducted study, we observed the effect of cognitive rehabilitation in the stroke patients. Stroke patients irrespective of gender, attending physical medicine and rehabilitation OPD and stroke clinic were included in study. Cognitive ability was assessed clinically using relevant assessment scales (MMSE, ACER,) and various tasks. Assessment of patients was done at three monthly intervals (0, 3, 6, 9 months) the results were compared with control group and analysed by appropriate statistical methods.

There was a significant improvement, in cognitive status after 9 month from the from the base line value (paired t test) in both cases and controls. However, statistical analysis failed to show any significant intergroup difference.

Key Words: Cognitive Rehabilitation, Stroke.

Introduction

With the understanding of neuropsychology and restorative neurology, cognitive rehabilitation has become an integral component of stroke management. Cognitive impairment is a major sequele of stroke, with significant cognitive deficits found in 35% of stroke patients[1, 2] a 3.7-point drop in Mini-Mental State Examination (MMSE) scores[3]. Patients with stroke who have cognitive impairment in addition to physical impairments have less recovery of physical function and more dependence in living after stroke[2,4,5]. These associations are evident despite variation in the instruments used to measure cognition and when the cognitive impairment is not severe enough to meet the criteria for dementia[6]. Although functional recovery can be affected by cognition-related factors such as preexisting dementia and depression. It may be that cognitive impairment also affects outcome through its interaction with the rehabilitation process. Numerous studies have noted a relation between rehabilitation success and degree of cognitive impairment, leading researchers to call for cognitive assessments an integral part of rehabilitation. How cognition interacts with the rehabilitation process is controversial & is largely backed by empirical evidence[7]. Patient characteristics, provider perceptions, practice guidelines &available treatments may all play a role in shaping the impact of cognitive impairment on stroke rehabilitation outcomes. For instance, a cognitive impaired patient may not be provided the same level of rehabilitation because of his her impairment (e.g., the patient is perceived as a poor candidate). Alternatively, rehabilitation program may not be designed to respond effectively to cognitive impairment in patients accepted for treatment[8.] For example, a program may fail to assess such patients for conditions like depression that are commonly associated with cognitive impairment[9]. In addition, cognitive impaired patents may not be able to benefit fully from rehabilitation because of their impairment[10]. Research suggests that this may occur in patients with a sensory deficit (contralateral neglect), attention deficits or impaired comprehension & learning. The purpose of cognitive retraining is the reduction of cognitive problems associated with brain injury, other disabilities or disorders.

The overall purpose of the therapy is to decrease the everyday problems faced by individuals with cognitive difficulties, thereby improving the quality of their lives[11]. Cognitive retraining includes a considerable amount of repetitive practice that targets the skills of interest. In fact, repetitions are essential for the newly retrained skills to become automatic[12]. Regular feedback is another important element of cognitive retraining. Retraining usually begins with simpler skills and proceeds to skills that more complicated. The therapist may address cognitive skills while the person is practicing real-life task,

Authors and their Affiliations

Dr Sanjay Kumar Pandey, MBBS, MD (PMR), Resident National Institute for the Orthopaedically Handicapped (NIOH), Bon Hooghly, BT Road, Kolkata.

Dr Sourav Iswarari, MBBS, MD (PMR),RMO Cum Clinical Tutor, Department of Physical Medicine and Rehabilitation (PMR), NRS Medical College & Hospital.,Kolkata

Prof Dr Ambar Ballav, MBBS, DGO, MD (PMR), Professor and Head, Department of PMR, IPGMER, Kolkata

Dr Ratnesh Kumar, MBBS, MS (Ortho) DNB (PMR), Director NIOH, Kolkata

Dr Koustubh Chakraborty, MBBS, MD (PMR), Registrar, Department of PMR, Peerless Hospital, Kolkata

Dr Kshetra Madhab Das, MBBS, MD (PMR), RMO Cum Clinical Tutor, Department of PMR, IPGMER,Kolkata

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Correspondence

Dr Sanjay Kumar Pandey
VISHNU ENCLAVE # 5G
229 N S C BOSE ROAD
Kolkata: 700047

Mobile: +91 9331272901.
E-mail: sashisanjaysashi@gmail.com

in an effort to improve their performance of these tasks. In fact, practicing skills in the ways and setting they will be used in real life is critical to the success of retraining efforts. The length of time for cognitive training varies according to the type and extent of the injury and the type of retraining skills used. For example, retraining memory may take months or years. In comparison, it may take only a few days or weeks to retrain someone to organize his or her home or workplace. The use of computers for cognitive retraining has become an increasingly common practice. In the study, the effect of cognitive rehabilitation in stroke patients was analysed[13,14,15].

Materials and Methods

Stroke patients of both genders admitted in IPGMER and SSKM hospital and attending Physical Medicine and Rehabilitation OPD and stroke clinic were included in study. Cognitive ability of patients assessed clinically using relevant assessment scales (MMSE, ACER) and various tasks (Blockdesign, Stick Construction). The study was conducted in the Department of Physical Medicine and Rehabilitation and Stroke Clinic at IPGMER, SSKM Hospital, Kolkata, during May 2006 to September 2007.

Inclusion criteria were patient admitted with stroke, out of coma, medically stable, out of crisis, requirement for a skilled level of care and not on maintenance level care, treatment program is supervised by a physician, requiring active nursing care such as administration of medications the services are reasonable and medically necessary and are within accepted standards of good medical practice.

Exclusion criteria were stroke cases aged less than 14 yrs of age, pregnancy, uncontrolled hypertension, uncontrolled blood glucose, associated co morbid condition e.g. cancer, AIDS etc.

Total number of patients were 107 (n=107), with 11 drop outs at various stages. Divided into cases (n=51), Group I and controls selected randomly (n=45) group II. Group I was experimental group, while group II was taken as control. Cognitive rehabilitation was given to group I (experimental group) only. Duration of study was 9 months Numbers of visits: four (0 initial visits 2nd after 3 mth, 3rd visit after 6mth, 4th visit after 9mth).

Informed consent was obtained and the study was carried out in accordance with the Institutional Ethics Committee.

Intervention: Only non-pharmacologic interventions were utilized in accordance to patient's cognitive impairment in the form of cognitive retraining. Informed consent was obtained from all the individuals and study was carried out in accordance with the Institutional Ethics Committee guidelines.

Types of cognitive retraining: used were: attention and concentration retraining, memory retraining, organizational skill retraining, reasoning, problem solving, decision making, executive skill.

Parameters for assessment: (alertness/level of consciousness) Alert, or somnolence, obtundation, stupor or semicoma, coma, attention, memory, thinking, perception, psychomotor behaviour higher cognitive functions, insight, judgment.

Characteristics of the Environment for Assessment

Physical Environment: Comfortable ambient temperature, adequate lighting, Free of distraction Position self to maximize individual's sensory abilities.

Interpersonal Environment: Pre assessment was done with friendly conversation to establish patient-professional relationship and use of self-paced rate for assessment.

Timing Considerations: The timing of the assessment selected was to reflect the actual cognitive abilities of individual and not extraneous factors. Assessment was divided to avoid fatigue and subsequent over exaggeration of deficits. Times of the day generally avoided were: Immediately after or before sleep, meals, and medical diagnostic or therapeutic procedures. The pain or discomfort were avoided.

Preparation: Cognitive retraining usually took place in a quiet environment without distractions. The individual was felt relaxed and calm while being retrained in cognitive skills. The cognitive retraining was avoided during emotional distress. The person's level of cognitive skills and extent were evaluated before retraining begins. This to monitor improvement by comparing the patient's skill levels during and after retraining to his or her skill levels before retraining. Patients were given cognitive retraining for 21 hours on an average (twice a week for 3 months). On each day they had a session of one hour (for 20 minutes each of block design training, stick construction and visual cancellation). Letter cancellation could not be done in uneducated patients.

Block Design: Blocks of different colours, sizes and shapes were used. The training used to begin with blocks of single colour, to different colours and then to various sizes and shapes. The test consisted of two block models that were presented one at a time. The patient was asked to construct an exact replica, selecting blocks from an assortment of 18 blocks. The time taken to complete each model was recorded in seconds, with a maximum of 5 minutes allowed. The score was obtained by crediting one point for each correctly placed block. If time taken to construct the two models was greater than the stipulated time, two points were subtracted from the score.

Stick Construction: Wooden sticks (½"x½"x3") were used to construct various designs from a given figure of stick construction (14 designs). The designs were assembled before the patient, who was then allowed to view each one for 10 seconds. The design was then swept away

and the patient was asked to reproduce it. One point for each correct item was given.

Visual Cancellation: The patient was asked to search the letter 'A' through a large number of letters and was asked to strike out the same. When he could not search any number he was cued by pointing out to them. If the patient neglected letters of one side, he was asked to scan the whole visual field.

For assessment of immediate memory, digit repetition test was used. For short term and long-term memory the patient was asked to remember four words (e.g., Rose, Apple, Chair, Salt) & them test his immediate recall and recall after 5 minutes and 30 minutes. If he was unable to recall any one, he was given cues figures. It was the name of flower; it was something we sit on).To improve attention the training was given in a quiet environment. The patient was verbally called to the task or if needed, his hand was moved to start the activity. To improve memory, initially the block or stick design were to be made with models kept in front. Later on, they were asked to reproduce them from memory. The patient was asked to rehearse any information he needed to remember. His attendants or family members were asked to give him visual or verbal cues to recall the names of things or persons (e.g., by using, photographs or by telling them the first letter of the word). As there were a very small number of educated patients, diaries or notebooks could not be used by of them. Notebooks were used only by 7 patients. In three cases, at the patient's home, we used a form of structured environment by labeling drawers and small boxes of daily utility items. 17 patients used alarm clocks to remember the time of taking medicines and other purposes.

The above mentioned training methods of Block Design and Stick construction, basically being a method of evaluation and treatment of Apraxic disorders were used as tools to improve memory, orientation, attention and concentration. Visual letter cancellation, basically being a method of testing visual neglect was also used to improve attention and concentration. For prosopagnosia pictures of popular movie stars and relatives (where possible), were shown and patients were asked to name them. These were done with each patient for 12 weeks and the patient evaluated at the end. Again each patient was evaluated at the end of 6 months and 9 months. (All the percentage values given in the study have been brought down to the nearest round figures). Aftercare we tried to promote the transfer of skills learned using cognitive retraining techniques to the patient's everyday life settings and demands. Training may be continued until the patient's skills are improved, transferred to, and maintained in real world activities. Cognitive retraining may be considered successful if performance on a behavior related to a particular cognitive skill has improved. It is important for the patient his friends or family members not to assume that improvement on training exercises and tests automatically lead to transfer of the skills to real-life settings. It is ultimately successful if it helps the injured person improve his or her functioning and meet his or her needs in real-life situations and settings.

Results and Discussion

Demographics Age/Sex distribution: The age of the patients ranged from 29 to76 years (range 65 years). Mean age of the patients was 51 years (Range 29-78 yrs).No. of males in Group I was 23(45.10%) while females was 28 (54.90%).In Group II number of males was 26 (57.78%) while females was 19 (42.22%). 62.75% Group I cases were from urban area and 37.25% from rural area, which may be due to easy accessibility for urban population. 51.11% Group II cases were from urban area and 48.89% from rural area.

Socioeconomic status: 49.02% of Group I cases belonged to low socioeconomic group and 37.25% were lower medium group3.92% to medium group 5.88% to upper medium group 3.92% to upper lower group. None of the patients belongs to Upper group. 42.22% Group II cases belonged to the low socioeconomic group and 20.00% were lower medium group2.22% to medium group 4.44% to upper medium group 28.89% to upper lower group and 2.22% of the patients belongs to Upper group.

Educational status: In Group I cases 19.61% received education up to higher secondary level, 45.10% up to primary school, and 13.73% were graduate and 19.61% uneducated. The educational status of Group II cases was 11.11% received education up to higher secondary level, 46.67% up to primary school, 2.22% were graduate, and 33.33% were uneducated, 2.22% were post graduate 4.44% attended secondary school. This difference was non-significant by Chi-square test (2-tailed p = 0.091) Handedness was Predominantly Right handed. Stroke Type was Predominantly Ischemic type. Associated medical condition: High Blood Pressure was observed to be more common than Diabetes Mellitus. This difference was non-significant by Fisher's exact test (2-tailed p = 0.382). In case of group I the mean value for MMSE score at first visit was found to be 23.725 and 26.411 at four visit (SD- 1.57 and 1.85 respectively), the mean value for ACER at first visit was 83.86 and at 9 month 88.43 (std.deviation – 2.34 and 3.82 respectively), for block design mean at initial value for ACER at first was 83.86 and at 9 month 88.43 (std. deviation- 2.34 and 3.82 respectively),f or block design mean at initial visit and final visit was 14.00 and 18.00 respectively (std.deviation-1.85 and 1.89 respectively) and for stick construction mean at initial visit and final visit was 12.00 and 14.00 respectively (std. deviation -1.39 and 1.51 respectively). In case of group II the mean value for MMSE score at

first visit was found to be 23.622 and 26.2888 at fourth visit (std.deviation – 1.52 and 1.74 respectively), the mean value for ACER at first visit was 84.244 and at 9 month 90.022 (std.deviation – 2.49 and 3.49 respectively), for block design mean at initial visit and final visit was 13.55 and 17.20 respectively (std. deviation – 1.17) and for stick construction mean at initial visit and final visit was 13.55 and 17.20 respectively (std.deviation – 1.17 and 1.35 respectively) and for stick construction mean at initial visit and final visit was 11.60 and 13.20 respectively (std.deviation – 1.07 and 1.14 respectively).

When comparison of numerical variable was done by unpaired t test the p value (0.037), t-value; - 2.11 was found in case of ACER at 9 at month score, (with mean for Group I = 88.43 and for Group II = 90.02). When comparison of numerical variable done by done by unpaired by unpaired t test the p value (0.037), t-value of -2.11 was found in case of ACER at 9 month score, (with mean for Group I = 88.43 and for Group II = 90.02).

For gender distribution (2-tailed p = 0.228) and urban and rural (2-tailed p=0.303) by Fisher's exact test in educational status (2-tailed p = 0.091) by Chi-square test were insignificant.

When comparison within Group I - baseline versus 9 month value – by paired t test was done the p-value (0.0000) was found, for MMSE Score (at t-value- 15.66), ACER Score (at t- value-11.85) block design (at t-value-13.42) and stick construction (at t-value-11.35) was found significant.

When comparison within Group II – baseline versus 9 month value – by paired t test was done the p-value (0.0000) was found, for MMSE Score (at t-value- 14.39), ACER Score (at t- value-11.99) block design (at t-value-18.32) and stick construction (at t-value-10.63) was significant. There was no significant difference in improvement of cognitive status in experimental group against control groups.

Due to poverty, illiteracy and resource constrains It is very difficult to convince that stroke has its associated cognitive problem& such impairment can be improved to improve their quality of life in day to day activity. This was evident by some of the patients who did not turn up after initial evaluation & cognitive retraining. In many other cases, the patients were brought only after some persuasion of the family. Most of cases were in the age group of 36 to 53 years. The cognitive impairment was observed in most of the patients irrespective of type of stroke. The cognitive improvement was observed on all parameter of assessment more or less in both the experimental as well as control group during the course of study similar to other studies.

Conclusion

In this case control study consisting of a sample of 106 stroke cases we found statistically significant improvement in over all cognitive status in both cases and controls. There was statistically significant positive co-relation with socio economic status which was noted irrespective of intervention.

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