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Assessment of cognitive-behavioral symptoms and functional status among stroke survivors

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Abstract

Background: Stroke is one of the complex causes of death and disability. Stroke survivors often experience cognitive-behavioral and functional changes. **Aim:** The present study aims to assess the cognitive-behavioral symptoms and functional status among stroke survivors. **Methods:** A descriptive study was done in Neurology and Neurosurgery Out Patient Department of a tertiary care hospital in India. Consecutive 55 adult stroke survivors who were conscious and accompanied by the caregivers were included in the study. Standardized tools such as mini-mental status examination (MMSE), Neuropsychiatric Inventory Questionnaire (NIP-Q), and Barthel index were used to assess the cognitive, behavioral symptom, and functional status of the patients. **Results:** Among 55 stroke survivors, 75% of survivors had normal cognition, 20% had a mild cognitive deficit, and 5% had a moderate cognitive deficit. Anxiety was present in 65.5%, apathy in 58.2%, and irritability in 54.5% of the patients. On the assessment of functional status, 40% of the survivors were independent, 23.6% had a moderate dependency, 18.2% had a slight dependency, and 18.2% had a severe dependency. **Conclusion:** Most of the survivors had various levels of deficits in cognitive, behavioral, and functional status. Common behavioral symptoms seen in patients of stroke included anxiety, apathy, and irritability. Nurses being part of the stroke team must carry out a comprehensive assessment of the cognitive, behavioral and functional status of the patients with stroke during follow up visits using brief, simple and valid tools. Appropriate and timely assessment is required to streamline the rehabilitation requirement and predict the outcome.

Key-words: Cognitive behavioral symptoms, Functional status, Stroke survivors

Introduction

Stroke is the most common cause of complex and severe disability, not only in developing countries like India but worldwide (Adamson, Beswick, & Ebrahim,

2004). The annual incidence rate of stroke in India varies from 100 to 300 per lakh population in urban and rural communities, respectively (Banerjee & Das, 2006). Roughly 15% to 30% of patients who have had stroke of stroke live with a permanent disability, which adversely affects their quality of life (Mohanty et al., 2018). After hospitalization, many patients have problems with cognition, behavior, and functional status (Zulkifly et al., 2016). Cognitive impairment is a spectrum of intellectual deterioration happening in an individual due to wide variety of reasons (Al-Qazzaz, Ali, Ahmad, Islam, & Mohamad, 2014), producing a progressive decline in cognitive ability over time (Xiong et al., 2014; Dhandapani, Gupta, Mohanty, Gupta, & Dhandapani, 2016). Similar to other neurological illnesses, stroke survivors may also feel anxiety, anger, or depression (Dhandapani, Dhandapani, Agarwal, & Mahapatra 2016; Dhandapani, Gupta, Mohanty, Gupta,

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& Dhandapani, 2017). Disabilities due to motor deficits, which limit an individual's capacity to perform activities of daily living (ADL), differ in developed and developing countries (Ferri et al., 2011; Bonner et al., 2016). While more than 70% of the stroke survivors in India live with some kind of disability, only 20 to 50% of the survivors have a disability in developed countries (Ferri et al., 2011). So, the assessment of cognitive-behavioral and functional status is an essential aspect of treatment that predicts the outcome.

The motor deficits, such as hemiparesis, aphasia, and dysphagia, along with its associated complications persisting after a stroke, leads to functional challenges in patients living with stroke. Limited movement of the patient also can lead to various complications such as contractures, shoulder pain, pressure sore, etc. (Tatemichi et al., 1994). The patients with stroke may become caregiver dependent due to such disabilities. Most of the caregivers of stroke survivors face a certain degree of burden due to higher severity of the stroke, degree of disability, depression, poor quality of life of the patient, loss of employment, and financial constraints (Isaac, Stewart, & Krishnamoorthy, 2011; Bhattacharjee, Vairale, Gawali, & Dalal, 2012; Sreedharan, Unnikrishnan, Amal, Shibi, Sarma, & Sylaja, 2013). The associated cognitive and neuropsychological changes, sensory or autonomic disturbances, and reduced utilization of rehabilitation add to the existing physical disability and lead to poor functional outcomes. Permanent disabilities adversely affect the stroke survivor's functional outcome and quality of life (Bhattacharjee et al., 2012; Sreedharan et al., 2013). So, the identification of these problems is necessary to aid in a suitable intervention. Assessment of cognitive-behavioral and functional status is an essential aspect of designing rehabilitation treatment that predicts the outcome. The present study was conducted to assess cognitive-behavioral symptoms and functional status among stroke survivors.

Materials and Methods

Research design: A cross-sectional study was conducted to assess the cognitive and behavioral deficits and functional status of the stroke survivors visiting the Neurology OPD after discharge from the hospital.

Study Setting: We conducted the study in the Neurology OPD, which is a tertiary care center in North India, where the state-of-the-art facilities are practiced for the care of patients with stroke and other neurological illnesses. We have a stroke team where stroke nurses play an active role in patient management from the entry point of the hospital until homecare. The stroke nurses are on duty round the clock. They also facilitate the transition of care from hospital to home while the patient is getting discharged. Stroke survivors are telephonically followed up after discharge while the patients continue to visit for the regular follow up.

Sampling Technique and Sample Size: A total enumeration with a consecutive sampling technique was used to enroll the patients from Neurology OPD. The sample size was not calculated due to the short duration of the study. We enrolled consecutively, 55 stroke survivors who visited the Neurology OPD for the follow-up. The duration of data collection was four months.

Inclusion Criteria: All adult stroke survivors who were conscious (GCS: E4V5M6), able to speak and had consented to participate in the study, were enrolled from neurology OPD.

Exclusion Criteria: Patients who had a stroke within the previous six months were excluded from the study.

Ethical Considerations: Ethical clearance for conducting the study was obtained from the Institute Ethics Committee. The purpose of the study was explained to the patients who visited OPD, and written consent was obtained. A patient information sheet was provided to the patients with information about the study and required contact details.

Tools: Appropriate standardized, reliable, and valid tools were selected based on the objectives of the study. Tools used for the study were the Mini-Mental Status Examination (MMSE) to assess cognitive assessment, Neuropsychiatric Inventory Questionnaire (NPI-Q) to assess behavioral symptoms and The Barthel Index to assess functional status.

Neuropsychiatric Inventory Questionnaire: It is a standardized tool that has been used to assess neuropsychiatric symptomatology in clinical practice

settings, including patients with neurological diseases. Neuropsychiatric behavioral changes in the patients of the intracranial tumor were assessed using NPI-Q. NPI-Q assesses the 12 behavioral disturbances in patients such as delusions, hallucinations, dysphoria, anxiety, agitation/aggression, euphoria, disinhibition, irritability/lability, apathy, motor activity, sleep disturbance and appetite disorder. The NPI-Q has been found to be reliable in cross-cultural studies. Its use is reported in the Indian setting (Dhandapani et al., 2017). NPI-Q has high reliability, sensitivity and validity. Internal consistency of the NPI-Q is good (Cronbach's $\alpha=0.756$), and the test-retest reliability of the NPI-Q is excellent ($r=0.99$). The administration time required for NPI-Q is six minutes. This tool is freely available in the open domain for noncommercial research studies (Cummings, Mega, Gray, Rosenberg-Thompson, Carusi, & Gornbein, 1994; Wong et al. 2014).

Barthel Index: This is developed by D W Barthel in 1965 to identify the patient's self-care abilities in 10 areas. The individual is scored on the independence of performance in several areas. The areas assessed are feeding, bathing, grooming, dressing, bowel control, bladder control, toileting, chair transfer, ambulation, and stair climbing. Based on the amount of assistance required to complete each activity, each item is rated. Total scores range from 0 (complete dependence) to 100 (complete independence). A score of 0-20 indicates total dependency, 21-60 indicates severe dependency, 61-90 indicates moderate dependency, and 91-99 indicates slight dependency, and 100 indicates independence. Inter-rater reliability was $r=0.849$ ($p<.001$) (Hocking, Williams, Broad, & Baskett, 1999; Rollnik, 2011).

Mini-Mental Status Examination: The areas assessed are person's attention, concentration, orientation to time and place, long-term and short-term memory, language ability, constructional praxis, abstract thinking, and list-generating fluency. This is used to screen for the cognitive loss and for the bedside cognitive assessment, it has a score ranging from zero to 30. A score of 24-30 means no cognitive impairment; 18-23 means mild cognitive impairment, and 0-17 means severe cognitive impairment. Test-retest reliability of the MMSE $r > 0.80$. The MMSE also correlates with other battery

of neuropsychological and cognitive assessments. The sensitivity of MMSE is 44% and specificity is 79% (Folstein, Robins, & Helzer, 1983; Crum, Anthony, Bassett, & Folstein, 1993).

Permission to Use the Tool: All three standardized tools were available in the public domain with the permission to use for academic research.

Data Collection Procedure: Patients who met the inclusion criteria and consented for the study were enrolled. Consent was taken after explaining the objectives of the study. The cognitive status of the patients was assessed using Mini-Mental Status Examination (MMSE); Neuropsychiatric Inventory Questionnaire (NPI-Q) was used to assess the behavioral symptoms and functional status was assessed using the Barthel Index. Data were entered into an Excel spreadsheet, cleaned, and prepared for analysis. The analysis was done using SPSS 18.

Results

The results of the study are described as per the objectives. Socio-demographic variables of the patients enrolled in the study are shown in Table 1.

Table 1:

Socio-demographic Profile of the Patients

		(N=55)		
Variable		Frequency(f)	Percentage(%)	
Age (in years)	Mean± SD,			
	≤40	52.3±13	13	23.8
	41-60		25	45.4
	>60		17	30.8
Gender				
Male		39	70.9	
Female		16	29.1	
Habitat				
Rural		33	60.0	
Urban		16	29.1	
Suburban		6	10.9	
Education				
Illiterate & just literate		13	23.7	
Primary		7	12.7	
High school & Secondary		28	50.9	
Graduation & above		7	12.7	

Occupation	Frequency	Percentage
Professionals	11	20.0
Skilled worker	14	25.5
Unskilled worker/ unemployed	30	54.5
Marital status		
Single	6	10.9
Married	46	83.6
Divorced	1	1.8
Widow/	2	3.6
Per-capita income (in rupees)		
<500	2	3.6
500-5,000	43	78.2
5,000-10,000	8	14.6
>10,000	2	3.6

The maximum number of patients (45.4%) belonged to the age group of 41-60 years with a mean age of the study participants being 52.3±13 years. The majority of the patients were males (70.9%), married (83.6%), and were rural residents (60.0%). The mean monthly per-capita income was Rs. 3595.4±3049.5 (Table 1).

Table 2:
Clinical Profile of the Patients

N=55			
Variables	Frequency	Percentage	
Diagnosis	Subarachnoid hemorrhage	8	14.5
	Intracranial hemorrhage	7	12.7
	Thrombotic CVA	36	65.4
	Thromboembolic CVA	4	7.3
Duration since the onset of stroke	6 months- 1 year	25	45.4
	> 1 year	30	54.6
Place of onset	Home	45	81.8
	Workplace	4	7.3
	Market	5	9.1
	Others	1	1.8
Position at onset	Squatting	7	12.7
	Lying	19	34.5
	Standing	18	32.7
	Sitting	11	20.0

Variables	Frequency	Percentage	
Activity during onset	Sleeping	14	25.4
	Just awoken	10	18.2
	After toileting	3	5.4
	Working	28	51.0

Majority of the patients had suffered from ischemic stroke (72%), out of which 65% suffered from the thrombotic event, 28% of patients with hemorrhagic stroke, an almost equal proportion of the patients had subarachnoid hemorrhage(15%) and intracranial hemorrhage (13%). More than half of the patients had been suffering from stroke for more than a year.

Stroke events occurred at home in the majority of the patients (81.8%). On assessing the position during the stroke onset, 34.5% developed stroke while lying, and 32.7% while standing. On assessing the activity during which stroke occurred, half of the patients developed stroke while performing work, and one-fourth of the patients developed stroke while sleeping.

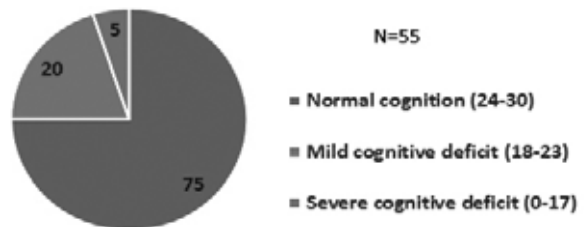


Figure 1: Cognitive status of the stroke survivors based on MMSE

As shown in Figure 1, the mean MMSE score of the patients was 26.3±4.17 out of 30, with a range of 15-30 (maximum possible score is 30). Out of 50 patients, 75% of survivors had normal cognition, 20% had mild cognitive impairment, and 5% had moderate cognitive impairment.

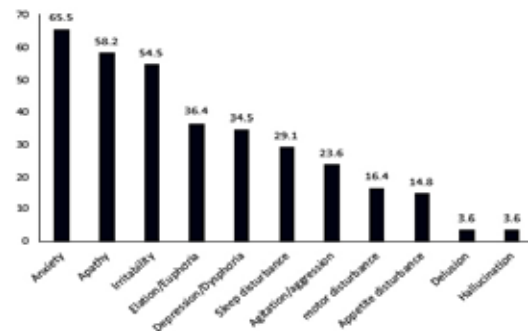


Figure 2: Behavioral symptoms of stroke survivors based on the neuropsychiatric inventory

Behavioral symptoms based on neuropsychiatric inventory elucidates that 65.5% of the patients had anxiety, followed by apathy in 58.2%, irritability in 54.5%, elation in 36.4%, and depression/dysphonic in 34.5% of the patients. Other neuropsychiatric symptoms reported were sleep disturbance, agitation, motor disturbance, appetite, delusion, and hallucination (Figure 2).

Functional status based on Barthel Index elucidates that among 55 survivors, 40% survivors were independent, whereas 18.2% had a slight dependency, 23.6% had a moderate dependency, and again, 18.2% had a severe dependency. The mean Barthel Index score was 84 ± 21.43 out of 100 (maximum possible score) with a range of 25-100 (Figure 3).

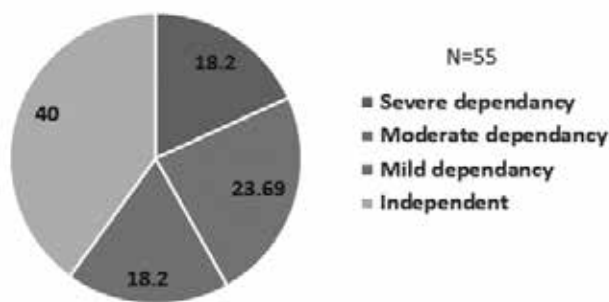


Figure 3: Functional Status of Stroke Survivors Based on Barthel Index

Discussion

The cognitive, behavioral, and functional status of the stroke survivors were assessed in the present study. Similar to existing evidence, most of the patients were male and of the age of more than 40 years. Permanent disability, dependency, and mortality are high among patients suffering from a stroke not only in developing countries but also in developed countries with advanced health care infrastructure (Özdemir, Birtane, Tabatabaei, Ekuklu, & Kokino, 2001).

Post-stroke cognitive deficits often occur in patients of stroke and are often ignored by healthcare providers. In the current study, the result showed that among 55 stroke survivors, cognitive impairment was found among one-fourth of the patients. The occurrence of post-stroke cognitive impairment ranged from 20% to 80%. The prevalence may vary among

different countries, maybe due to the varying level of importance given to post-stroke cognitive assessment in different healthcare setups (Sun, Tan, & Yu, 2014; Gbiri, Akinpleu, Ogunniyi, Akinwuntan, & Van Staden, 2015). In patients of subarachnoid hemorrhage, diminishing recent memory, remote memory, and phonemic fluency were reported (Patel, Coshall, Rudd, & Wolfe, 2002; Rist et al., 2013). Patients with cognitive deficits may not have good understanding and hence adherence to the various modalities of rehabilitation. It was reported that 38% of the patients with cognitive deficits have a comparatively poor outcome at three months (Mahak et al., 2018).

In day to day practice, identifying behavioral symptoms after stroke is often ignored. The identification of neuropsychological symptoms such as depression, anxiety, apathy, etc. can be complex due to the overlap between the symptoms of stroke and the behavioral symptoms and also due to cognitive and communication deficits. We must choose appropriate techniques and tools to identify behavioral symptoms in these patients, especially from the patients who have cognitive and communication deficits.

In the current study, behavior symptoms were assessed by the Neuropsychiatric Inventory in which most common behavior problems were anxiety (65.5%), apathy (58.2%), irritability (54.5%), euphoria (36.4%), depression/dysphoria (34.5%), sleep/night time behavior disturbance (29.1%), agitation/aggression (23.6%), motor disturbances (16.4%), delusion and hallucination (3.6%).

A study conducted in Italy on neuropsychiatric symptoms in stroke survivors reported that the most common behavioral symptoms were depression (61%), irritability (33%), eating disturbances (33%), agitation (28%), apathy (27%) and anxiety (23%) (Go et al., 2014). These findings were in line with the findings of the present study. Apathy, a state of lack of emotion or interest, may be present in isolation or may co-exist with depression (Go et al., 2014) and is reported in approximately 30% of the stroke survivors (Kneebone & Lincoln, 2012). Anxiety and irritability also are very common and can burden the caregivers equally (Åström, 1996; Angelelli et al., 2004). Many of

the behavioral symptoms are often overlooked during hospitalization; hence it is necessary to identify these symptoms during follow up.

Disability following a stroke leads to deterioration in the quality of life and the burden on caregivers. In a study by Rosamond et al., (1999), 15% to 30% of stroke survivors were reported to have permanent disability despite medical and surgical treatment for stroke. Many factors, such as age and associated co-morbidities, increase the proportion of patients with permanent disabilities (Go et al., 2014). Accurate assessment and identification of physical and functional deficits are mandatory to aid the best rehabilitation treatment in patients of stroke. In the present study, independent stroke survivors were 40%, slightly dependent 18%, moderate dependent 24% and fully dependent were 18%. Eriksson et al., (2008) reported in his study that 73.1% of the stroke survivors are dependent in the early post-stroke phase and are involved in the acute stage of rehabilitation and depended on caregivers for their activities of daily living (Eriksson, Norrving, Terént, & Stegmayr, 2008). Similarly, the present study also found that most of the stroke survivors continue to live with disabilities as they are having associated hemiparesis (63.6%) and difficulty in performing activities of daily living (52.7%).

Various factors determine the neurological outcome of patients with stroke (Xiong et al., 2014; Dhandapani, et al. 2015; Dhandapani, Kapoor, Gaudihalli, Dhandapani, Mukherjee, & Gupta, 2015; Kapoor et al. 2018; Aggarwal et al. 2018). The present study has identified various behavioral symptoms present in stroke survivors. Behavioral symptoms such as depression, agitation, irritability, anxiety etc. can result in poor therapeutic compliance among the patients and hence can influence the outcome of patients. Behavioral symptoms are reported to be one of the important factors that contributed to the burden among caregivers of patients with other neurological illnesses (Dhandapani et al. 2015). Considering the high prevalence, cognitive-behavioral and functional deficit assessment must be given due priority while monitoring the health status and quality of life of stroke survivors.

Along with physical rehabilitation, cognitive-behavioral therapy as well as brief counseling sessions, may benefit the survivors suffering from various cognitive and behavioral symptoms. Rehabilitation outcomes could be better predicted if we incorporate the cognitive and behavioral deficits along with the functional deficits. Nurses have an important role in identifying these deficits using appropriate tools and guiding the patients to appropriate rehabilitation facilities (Mahak et al., 2018). The tools used in the present study are simple as well as brief and can be used by nurses during the follow up of the patients. Timely assessment of the cognitive and behavioral changes along with the functional status, aids in choosing appropriate individualized rehabilitation services for the patients. Nurses should take a lead role in the assessment, especially in constrained settings where neuropsychologists are available, but limited in number. Brief nurse-led counseling can be provided to patients with behavioral symptoms (Dhandapani, 2016; Thakur, Dhandapani, Ghai, Mohanty, & Dhandapani, 2019). Studies on the effectiveness of various interventions on alleviating the cognitive psychological symptoms can be conducted to create evidence-based interventions for improving the outcome of the patients living with stroke.

Conclusion

Most of the survivors in the present study had various levels of deficits in cognitive, behavioral, and functional status. Common behavioral symptoms seen in patients of stroke included anxiety, apathy, and irritability. Nurses must be a part of the stroke team and must perform cognitive, behavioral, and functional status of the patients with stroke during their follow up using brief, simple, and valid tools. Appropriate and timely assessment should be in practice for patients of the stroke to streamline the rehabilitation requirement and predict the outcome.

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