The Profile of Behavioral and Psychological Symptoms of Dementia in Post-stroke Vascular Cognitive Impairment

Fasihah Irfani Fitri, Aldy S. Rambe, Aida Fithrie
Department of Neurology Universitas Sumatera Utara/ Adam Malik General Hospital

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Abstract: Behavioral are standard features of all types of dementia, irrespective of disease etiology and stage, including vascular cognitive impairment (VCI). The study aimed to examine the BPSD profile in post-stroke patients with VCI. This cross-sectional study involved 76 post-stroke patients with vascular cognitive impairment. The mean age was 57.95±10.54 years old. Thirty patients (39.47%) had at least one symptom of BPSD. The most common symptom was apathy and indifference (15 patients; 19.7%), followed by depressive and gloomy mood (13 patients, 17.1%). The least frequently found symptom was a violent force, which was only seen in 2 patients (2.6%). There was no significant difference in BPSD profile between ischemic and hemorrhagic stroke. BPSD was a common finding in post-stroke VCI, with apathy being the most common symptom. Early identification may lead to better management and may increase the quality of life.

1 INTRODUCTION

Behavioral and psychological symptoms of dementia (BPSD), also called neuropsychiatric symptoms (NPS), are standard features of all types of dementia, irrespective of disease etiology and disease stage. [Dillon et al,2013; Gupta et al,2014; Mortbya et al,2017; Tiel, 2015; Zhang, 2012]. The presence of BPSD in vascular cognitive impairment (VCI) has a significant impact on the patient's functional and cognitive status. [Dillon et al,2013; Gupta M et al,2014; Tiel, 2015]. BPSD are associated with high caregiver burden, poor prognosis, and higher rates of institutionalization and drug therapy; all of which contribute to an increased social and economic impact on people with dementia. [Dillon, 2013] Caregivers of dementia patients report BPSD, especially symptoms like aggression and screaming, to be the most difficult problem to cope with.[Gupta, 2014]. BPSD are a heterogeneous group of non-cognitive symptoms and behaviors and are observed in high rates across the spectrum from mild cognitive impairment to dementia. They are among the most challenging and costly aspects of dementia, and, if left untreated, are associated with hastened disease progression, worsened daily functioning, impaired quality of life, increased health care utilization, and accelerated placement in residential care, increased utilization of medical resources, more caregiver stress, diminished quality of life for the persons with dementia and their families, and higher economic burden on the caregivers.[Mortbya, 2017; Zhang, 2017]. Vascular cognitive impairment (VCI) refers to the entire spectrum of cognitive impairment occurring as a result of the cerebrovascular disease. The present concept of VCI encompasses not only vascular dementia (VaD) but also mixed dementia and vascular cognitive impairment-no dementia (VCI-ND). VCI-ND refers to that subgroup of patients who manifest cognitive deficits resulting from cerebrovascular disease, but do not meet the definition of dementia.[Gupta, 2014]. The management of BPSD has the potential to alleviate much of the suffering of dementia patients and their caregivers, so early identification and assessment of BPSD is an essential part of an evaluation of patients with cognitive impairment. The present study aimed to examine the profile of BPSD in post-stroke VCI.

2 METHODS

This cross-sectional study involved 76 post-stroke patients which were recruited from the Memory Clinic Neurology Department Adam Malik General Hospital Medan North Sumatera Indonesia, between

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March and June 2018. This study included patients with a history of stroke for more than three months to two years, had a minor physical disability, fully cooperative, speak Bahasa Indonesia fluently, able to read and write, and gave written consent to be included in the study. Exclusion criteria were: subjects with major psychiatric disorders had aphasia or history of dementia before a stroke. All subjects underwent neurologic evaluation and cognitive assessment using Montreal Cognitive Assessment Indonesian Version (MoCA-INA) and complete neuropsychological evaluation including assessment of attention, memory, language, executive function and visuospatial, as listed in CERAD (Consortium to Establish a Registry for Alzheimer's Disease).(Fillenbaum, 2008; Husein, 2010; Nasreddin, 2005). The neuropsychiatric symptoms were evaluated using Abe BPSD Score (ABS) which assessed 10 symptoms including wandering in/outside home, eating or toilet problem, delusion or hallucination, offensive and abusive words, day-night reversal, excitation and agitation, apathy and indifference, depressive and gloomy mood, violent force and high irritability. [Abe, 2015]. All statistical procedures were performed with SPSS. The Health Research Ethical Committee Medical Faculty of Universitas Sumatera Utara/H. Adam Malik General Hospital approved this study.

3 RESULTS

This study included 76 subjects consisted of 44 (52.9%) males and 32 (47.1%) females. The mean age was 57.95±10.54 years old. Most of the patients aged between 51 to 55 years old (26.3%) and had 12 years of education or finished high school (39.5%). There were 70 patients (92.1%) with a history of ischemic stroke and six patients (7.9%) with hemorrhagic stroke. Most of the patients had a positive history of hypertension. Table 1 summarizes the clinical characteristics of the patients.Thirty patients (39.47%) had at least one of the BPSD symptoms. The most common symptom was apathy and indifference (15 patients; 19.7%), followed by depressive and gloomy mood (13 patients, 17.1%). The least frequently found symptom was the violent force, which was found only in 2 patients (2.6%). There was no significant difference in the frequency of BPSD symptom between patients with a history of ischemic and hemorrhagic stroke. Table 2 shows the frequency of BPSD in both groups.

Table 1. Demographic and Clinical Characteristics of the Patients

Variables	N (total 76)	Percentage (%)
Sex		
Male	44	52.9
Female	32	47.1
Age (years), mean ± SD	57.95±10.541	
Age group, years old		
<45	5	6.6
46-50	8	10.5
51-55	20	26.3
56-60	16	21.2
61-65	13	17.1
66-70	5	6.6
71-75	3	3.9
76-80	5	6.6
>80	1	1.3
Educational level		
Primary	13	17.1
Junior High School	15	19.7
High School	30	39.5
Diploma	2	2.6
University	16	21.1
Occupation		
Employee	24	31.6
Housewive	12	15.8
Entrepreneur	19	25.0
Farmer	4	5.3
Unemployed	17	22.4
Stroke Aetiology		
Ischemia	70	92.1
Hemorrhage	6	7.9
Hypertension		
Yes	67	88.2
No	9	11.8
Diabetes Mellitus		
Yes	30	39.5
No	46	60.5
Atrial Fibrillation		
Yes	2	2.6
No	74	97.4

4 DISCUSSION

Our data show that BPSD in post-stroke cognitive impairment was relatively common, occurring in almost 40% of the patients. This number was lower than previous studies that reported the occurrence of BPSD was as high as 95% in VCI and VaD.[Chiu , 2013;Gupta, 2013; Staekenborg, 2010]. This could partly be explained by the fact that in our study we

included all post-stroke patients who had cognitive impairment and we did not classify the patients based on the severity of the VCI, nor did we differentiate patients with VCI-ND from those with VaD. Thus, it could affect the proportion of patients with BPSD because the severity and occurrence of BPSD are different in various stages of dementia.[Huang, 2017;Zhang, 2012].

Table 2. Frequency of BPSD Symptoms

Symptoms	Total (76) N (%)	Ischemic (70) N (%)	Haemorrhage (6) N (%)	P
Wandering in/outside home	9 (11.8)	8 (11.4)	1 (16.7)	NS
Eating or toilet problem	10 (13.2)	9 (12.9)	1 (16.7)	NS
Delusion or hallucination	7 (9.2)	7 (10)	0	NS
Offensive and abusive words	7 (9.2)	7 (10)	0	NS
Day-night reversal	10 (13.2)	9 (12.9)	1 (16.7)	NS
Excitation and agitation	10 (13.2)	10 (14.3)	0	NS
Apathy and indifference	15 (19.7)	13 (18.6)	2 (33.3)	NS
Depressive and gloomy mood	13 (17.1)	12 (17.1)	1 (16.7)	NS
Violent force	2 (2.6)	2 (2.9)	0	NS
High irritability	6 (7.9)	6 (8.6)	0	NS

We found apathy and depression were the most common symptoms of BPSD, and violent force was the least common symptom. This is consistent with several previous studies. Gupta. (2014) reported that depression was the commonest BPSD at 73.3% and apathy was found in 35% of the cases. Disinhibition (8%), euphoria, and hallucinations (5% each) were the least common of the BPSD on the NPI.[Gupta, 2014]. Apathy and depression were the most common neuropsychiatric manifestation of VCI irrespective of the subtype and the severity of the disease. A review of the total of 82 studies which compared several types of VaD found that apathy and depression also occurred sometime during the disease. From 13 articles selected in that review, four compared BPSD in Subcortical Vascular Dementia (SVaD) versus Cortical-Subcortical Vascular Dementia (CSVaD), three involved comparisons between SVaD and VCI-ND, one study analyzed differences between CSVaD and VCI-ND, while five studies assessed BPSD in CSVaD. Subcortical and Cortical-Subcortical VaD were associated predominantly with apathy and depression. VCI-ND may present fewer behavioral symptoms than VaD.[Tiel, 2015]. Despite considerable advances in the detection of brain vascular-related syndromes in recent years, the association between vascular lesions and both cognitive symptoms and BPSD in VCI remains controversial. For instance, data in the literature suggests that BPSD may occur in VCI, regardless of the development of dementia. BPSD may also appear at any stage, induced by cerebrovascular lesions disrupting the cortical-subcortical circuits between prefrontal cortex connections to limbic nuclei of the basal ganglia and thalamus, and other limbic system structures. This suggests that better characterization of vascular-related BPSD, and the underlying mechanisms of brain injury associated with these features, is still needed to allow the adoption of effective evidence-based prophylactic and therapeutic measures.[Tiel,2015].

Apathy typically occurs following disruption of circuits linking subregions of the prefrontal cortex and subcortical structures, such as the basal ganglia, implicated in reward processing and complex planning. Clinical definitions of apathy have distinguished between cognitive and emotional aspects of goal-directed behavior. Anterior cingulate atrophy has been associated with reduced initiation while executive dysfunction has been associated with the pathology of the dorsolateral prefrontal cortex and reduced reward sensitivity with underactivation of the orbitofrontal cortex. [Gallagher, 2017]. Apathy is known to be common in subcortical ischaemic vascular disease owing to the occurrence of white matter lesions and/or lacunar infarcts in the basal ganglia and thalamus, which lead to interruption of cortico-subcortical circuits.[Gupta, 2014] Apathy in the context of VCI has been associated with ‘‘vascular depression’’ and depression with executive dysfunction. It is important to differentiate apathy from depression as apathy may occur independently from depression. In such cases, there is typically a relative absence of distress and negative cognitions so commonly observed in depression.[Gallagher, 2017].

Several mechanisms might link depression, anxiety, and cognitive decline. Depression has long been associated with hypercortisolemia, and recurrent depression has previously been associated with the reduced hippocampal volume. Cerebrovascular disease has been particularly associated with depression in later life and may precipitate and perpetuate depression via disruption of corticostriatal

tracts necessary for cognitive and emotional regulation. Increased inflammation, decreased secretion of trophic factors, and increased oxidative stress are mechanisms that may link depression and cognitive decline at a molecular level, while at a behavioral level, physical inactivity and other adverse health behaviors have been associated with accelerated cognitive decline. [Gallagher,2017]

This study has several limitations. First, we did not classify the patients based on the difference subtype of post-stroke vascular cognitive impairment, which may have a different pato-mechanism in causing cognitive impairment. Second, we did not analyze the presence of BPSD based on the severity of the cognitive impairment or the impact on daily life activities.

5 CONCLUSIONS

In conclusion, BPSD is very common in post-stroke VCI, with apathy and depression being the most common symptoms. Early identification and assessment of BPSD in post-stroke patients may lead to better management and may increase the quality of life and lessen the caregivers' burden.

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