Clinical Neuroscience & Neurological Research International Journal
ISSN: 2689-6001

Academic Strive
Researcher's Perception is our Reality

Research Article *Volume 4 Issue 1*

Prevalence, Risk Factors, and Outcome of Post-Stroke Delirium

Shady Elrashedy S[1], Ahmed Esmael[1]*, Mohammed Abbas M[1], Saad Shawki[1] and Simaa Elgamal[3]

[1]Neurology Department, Mansoura University, Egypt
[2]Neuropsychiatry Department, Port-said University, Egypt
[3]Neurolog y Department, Kafr Elshiekh University, Egypt

***Corresponding author:** Ahmed Esmael, Neurology Department, Mansoura Faculty of medicine, Mansoura University, Mansoura 35516, Dakahlia, Egypt, Email: deltaneuro@yahoo.com

Received Date: November 20, 2021; **Published Date:** December 03, 2021

Abstract

Objective: The aim of this study was to assess the incidence and risk factors of delirium in acute ischemic stroke and its role in functional outcome.

Methods: Delirium Observation Screening Scale/Delirium Observation Scale was used to assess patients presented by acute ischemic stroke for the severity of post-stroke delirium. Neurologic deficits were evaluated with the National Institutes of Health Stroke Scale (NIHSS) and Glasgow coma scale (GCS). Functional outcome assessment included the modified Rankin Scale at 3 months after stroke onset.

Results: The study was conducted on 100 patients, included 65 males (65%) and 35 females (35%). Patients were divided according to the presence of delirium into 14 (14%) patients with Post Stroke Delirium (PSD) and 86 (86%) patients without PSD (mean age 66±11 and 60±14 respectively). Infections, metabolic disturbances and previous stroke were significantly associated with PSD. Cases with left cortical infarcts and cases with left subcortical infarcts were significantly associated with PSD. Higher initial NIHSS lower initial GCS, and old age patients were highly associated with PSD. Ischemic stroke patients with PSD were associated with higher mortality rates and bad outcome compared with ischemic stroke patients without delirium.

Conclusion: The incidence of delirium in cases of acute ischemic stroke was 14%. Older age, infections, previous stroke, stroke severity, left cortical and left subcortical infarcts were risk factors for PSD. Higher mortality and bad outcome were associated with PSD.

Keywords: Post-Stroke Delirium; Modified Rankin Scale; Delirium Observation Screening Scale

Introduction

Cerebral stroke defined as a rapid focal or massive neurological lesion for more than one day with a vascular cause, the second common death etiology and the seventh disability disease all over [1,2]. American Psychiatric Association defines delirium as an acute, transient deficit of cognition and conscious level with fluctuating course [3]. Prevalence of PSD has been estimated at around thirty percent in admitted patients [4], and detected in a rate of 30% up to >50% in older patients [5].

The affection of attention and orientation to the surroundings is the main symptomatology of the disease. In addition to cognitive impairment (As memory affection, language, orientation, or visuospatial function) is also needed to confirm diagnosis. Post stroke delirium (PSD) in acute ischemic stroke is very common [2]. There were no enough

studies in PSD incidence which estimated from about 12% up to 66%. But, these studies were included hemorrhagic as well as ischemic strokes and this leads to heterogeneous data [6]. So, it is important to study a homogeneous sample of cases. The aim of the study was to detect the prevalence and the associated risk factors of delirium in acute ischemic stroke and its role in disability and outcome.

Material and Methods

An informed consent was taken from each patient or relative. This study was conducted on one hundred clinically diagnosed acute ischemic strokes in patients obtained from neurology departments of Mansoura University Hospital, with the following Inclusion criteria: acute ischemic stroke in age over 18 years, first or recurrent acute ischemic stroke diagnosed by MRI brain examination.

Transient ischemic attack (TIA), cerebral hemorrhage (ICH), subdural hematoma, or subarachnoid hemorrhage (SAH); central nervous system diseases other than stroke (eg, dementia, Parkinson's disease, or multiple sclerosis); and severe mental disorders (eg, schizophrenia) are among the exclusion criteria.

All patients were subjected to the following: Detailed history, including age, sex, history of previous stroke, HTN, DM, AF, and therapeutic history. Brain MRI scans, including T1 weighted imaging, T2 weighted imaging and diffusion weighted imaging (DWI) were carried out for all the participants [7,8].

Between the first and third days after admission, each patient was examined for delirium for the first time. We decided to know the patients for PSD twice because it can happen at any time during their hospital stay [9]. Delirium Observation Screening Scale was used to evaluate the severity of cases. Delirium Observation Scale is a 25-item scale, was developed to facilitate early diagnosis of delirium, based on nurses' observations during regular care [10]. Treatment of the PSD patients was done in accordance with national clinical practice recommendations [11].

Ischemic stroke subtypes were classified according to the TOAST classification into large vessel disease (large atherosclerosis), cardioembolic stroke, small vessel disease (lacunar stroke), and undetermined stroke [12].

The clinical outcomes were assessed at 3 months according to the modified Rankin Scale (mRS), which estimates the disability and can be utilized as a prognostic scale in stroke patients and divided into seven outcomes (0-6) [13].

Statistical Analysis

The IBM SPSS software program version 20.0 was used to examine the collected data for statistical analysis. Number and percent were used to describe qualitative data. Minimum and maximum, mean, standard deviation, and median were used to describe quantitative data.

The significance of the acquired results was assessed at a 5% level. To compare between different groups, Monte Carlo correction for categorical variables was performed. When more than 20% of the cells have an expected count of less than 5, chi-square is corrected. Multivariate logistic regression was done for analysis of risk factors for PSD.

Results

The study was conducted on 100 patients, included 65 males (65%) and 35 females (35%). Patients were divided according to the presence of delirium into 14 (14%) patients with Post Stroke Delirium (PSD) and 86 (86%) patients without PSD (mean age 66±11 and 60±14 respectively).

According to severity of stroke, the initial NIHSS scale was 16±13 in PSD patients and 10±14 in patients without PSD ($P < 0.001$). Also the initial GCS was 7 ± 6 in patients with PSD and 10 ± 4 in patients without delirium ($P < 0.001$) (Table 1).

Variable	Total patients	Patients with PSD	Patients without PSD	P value
Number	100 (100%)	14 (14 %)	86 (86 %)	
Age (years)	62 ± 13	66 ± 11	60 ± 14	P < 0.001
Sex				
Male	65 (65%)	9 (64.3%)	56 (65.1%)	NS
Female	35(35%)	5 (35.7%)	30 (34.9%)	
Initial NIHSS	12 ± 14	16 ± 13	10 ± 14	P< 0.001
Initial GCS	9 ± 5	7 ± 6	10 ± 4	P< 0.001

Table 1: Demographic and Clinical Characteristics of Patients.

Hypertension was the most frequent risk factor for stroke in our study (in 71 patients (71%), the second frequent risk factor was DM in 47 patients (47%), and AF in 15 patients (15%). There were no significant difference in patient with and without PSD regarding the presence of hypertension, DM and AF. While, the presence of infection, previous stroke, and metabolic disturbances were significantly associated with delirium (P < 0.001) (Table 2).

Variable	Total patients	Patients with PSD	Patients without PSD	P value
Number	100 (100%)	14 (14 %)	86 (86 %)	
Risk factors				
HTN	71(71%)	10 (71.4%)	61(70.9%)	NS
DM	47 (47%)	5 (33.1%)	42 (48.8%)	NS
AF	15 (15%)	2 (14.3%)	13 (15.1%)	NS
Previous stroke	16(16%)	5 (33.1%)	11(12.8)	P< 0.001
Infections	22 (22%)	8 (57%)	14 (16.3%)	P< 0.001
Metabolic factors	19 (19%)	7 (50%)	12 (14%)	P< 0.001

Table 2: Risk Factors and Associated Causes of PSD in Ischemic Stroke.

Stroke subtypes in our sample of patients were non-significantly associated with PSD. Large artery stroke occurred in 40 patients without PSD (46.5%) and in 6 PSD patients (43%). Twenty four patients without PSD presented with small artery subtype and in only 3 patients with PSD (21.5%). Cardioembolic stroke was detected in 11 (12.8%) non delirious patients and in 2 patients (14.3%) with PSD. Also, patients with PSD due to other etiologies or unknown cause were not differing significantly from non-delirious patients (Table 3).

Variable	Total patients	Patients with PSD	Patients without PSD	P value
Number	100 (100%)	14 (14 %)	86 (86 %)	
Stroke subtypes				
Large artery	46 (46%)	6 (43%)	40 (46.5%)	
Small artery	27 (27%)	3 (21.5%)	24(28%)	NS
Cardioembolism	13 (13%)	2 (14.3%)	11(12.8%)	
Other etiologies	5 (5%)	1(7.15%)	4 (4.6%)	
Unknown etiologies	9 (9%)	2 (14.3%)	7 (8.1%)	

Table 3: Stroke Subtypes in Patients with and without PSD.

Table 4 showed the radiological findings in patients with and without PSD demonstrated that cases with left cortical infarcts and cases with left subcortical infarcts were significantly associated with PSD. While, cases with right cortical, right subcortical stroke brainstem and cerebellar regions were not significantly associated with PSD.

Variable	Total patients	Patients with PSD	Patients without PSD	P value
Number	100 (100%)	14 (14 %)	86 (86 %)	
Site of infarcts				
Left cortical region	17 (17%)	5 (33.1%)	12 (14%)	P< 0.001
Right cortical region	13 (13%)	2 (14.3%)	11(12.8%)	NS
Left subcortical region	31(31%)	4 (28.5%)	27 (31.4%)	P< P=0.001
Right subcortical region	24 (24%)	1(7.15%)	23 (26.7%)	NS
Brainstem	8 (8%)	1(7.15%)	7 (8.1%)	NS
Cerebellum	7 (7%)	1(7.15%)	6 (7%)	NS

Table 4: Radiological findings in patients with and without PSD.

As regard multivariate logistic regression of risk factors for PSD, previous stroke (P value 0.005), infections (P value 0.005), metabolic disturbances (P value 0.005), left cortical (P value 0.001), and left subcortical region stroke (P value 0.001) were more significantly associated with PSD. In the other hand, higher initial NIHSS (P value 0.006), lower initial GCS (P value 0.009) and older age (P value 0.01), were less statistically significant (Table 5).

Variable	OR	95% CI	P value
Age	1.14	0.98 -1.78	0.01
Initial NIHSS	1.29	1.11-1.93	0.006
Initial GCS	1.18	1.02 - 1.82	0.009
Previous stroke	2.53	1.36 - 5.13	0.005
Infections	2.61	1.06 - 5.04	0.005
Metabolic factors	2.53	1.17 - 4.86	0.005
Left cortical region	3.32	1.57 - 6.14	0.001
Left subcortical region	2.98	1.43 - 4.87	0.001

Table 5: Multivariate logistic regression of risk factors for PSD.

Outcome of ischemic stroke patients in our study was significantly worse with PSD. Total mortality rate was 10% of all patients, in 28.5% of patients associated with PSD and only 6.9% of patients without PSD. Modified Rankin Scale after 3 months of onset in our study was 4.2 ± 1.3 in patients with PSD and 1.3 ± 1.1 in the non-delirious patients (Table 6).

Outcome	Total patients N (100)	Patients with PSD N (14)	Patients without PSD N (86)	P value
Mortality	10 (10%)	4(28.5%)	6 (6.9%)	P< 0.001
Modified Rankin Scale after 3 months	3.1 ± 1.2	4.2 ± 1.3	1.3 ± 1.1	P< 0.001

Table 6: Relationship between incidence of post-stroke delirium and the outcome of patients.

Discussion

The occurrence of PSD was 14% of all patients in the study and reflecting that it is common among acute ischemic stroke and mainly with older patients, pervious strokes, severe stroke, infection, metabolic disturbances and left hemispherical infarction. Delirium mainly presented in the early course of stroke is associated with worse outcome, so, it is important to give more attention to PSD.

PSD incidence in this study is comparable to the results of preceding results (11.8 - 66%) [1,6,14-16]. The different results of incidences may be caused by mix groups of patients, variable age, different number and management time and place.

Due to PSD might prolong the admission time, mortality and more disability, [6] it should be managed early for admitted cases with ischemic cerebral stroke. Severity of stroke onset had a significant relation with patients associated with PSD. This agreed with most of previous studies and explained by that delirium affecting NIHSS and GCS score [7].

As expected, older age, infection, metabolic disturbances and previous strokes were significant risk factors of PSD and these results were in agreement with previous studies on the same topic and also to admitted cases with other disorders [6, 17].

We found that ischemic stroke subtypes in our sample of patients were non-significantly associated with PSD. PSD detected more with left hemispherical infarction which agrees with few studies [1]. This finding is new and opposes others studies results that detected the PSD more with right cerebral, [18] frontal lobe, [19] or medial occipito-temporal lobe [20]. But these results detected in both hemorrhagic and ischemic cerebral insults, with heterogeneous sample of patients. They used CT brain scans also not MRI brain for evaluation of strokes [6]. Common pathway affections noticed in the pathophysiology of PSD could tell us the differences. Emotion, memory, and motivation controlled by dominant cerebral hemisphere, mainly the limbic system part and the prefrontal are [21]. Lesions in these areas results to increase delirium incidence.

Our results showed that mortality and disability outcome (detected by the modified Rankin Scale mRS) were worse in patients with delirium. This was similar to previous studies [1,6,14], that found higher mortality, prolonged admission duration, and more disability in patients with PSD.

The positive about our results was that we depend on homogenous group of cases and using MRI brain scans which are more specific to detect ischemic area and evaluate underlying abnormalities. While, the main limitations were first the relatively small sample size of patients, second, lake of cognition evaluation or the treatment side effect consideration. Third, NIHSS score did not measured after patient discharge which led to disability outcome fewer data.

Conclusion

PSD occurred in 14% of our patients in the first week of insult of acute cerebral infarction. Older age, infection, metabolic disturbances, recurrent stroke, sever stroke, and left hemispherical ischemia were indicators of post stroke delirium. PSD leads to bad disability outcome. Physicians must give more care to the early detection and management of PSD.

References

1. Qu J, Chen Y, Luo G, Zhong H, Xiao W, et al. (2018) Delirium in the Acute Phase of Ischemic Stroke: Incidence, Risk Factors, and Effects on Functional Outcome. J Stroke Cerebrovasc Dis 27(10): 2641-2647.

2. American Psychiatric Association (2013) DSM-5 Task Force. Diagnostic and statistical manual of mental disorders: DSM-5. Arlington: American Psychiatric Publishing; pp: 596-601.

3. Zaitoun AM, Elsayed DAF, Ramadan BM, Gaffar HAA (2019) Assessment of the risk factors and functional outcome of delirium in acute stroke**.** The Egyptian Journal of Neurology, Psychiatry and Neurosurgery 55: 17.

4. Rollo E, Callea A, Brunetti V, Vollono C, Marotta J, Imperatori C, et al. (2021) Delirium in acute stroke: A prospective, cross-sectional, cohort study. Eur J Neurol 28(5): 1590-1600.

5. McCusker J, Cole M, Abrahamowicz M, Primeau F, Belzilee E (2002) Delirium predicts 12-month mortality. Arch Intern Med 162(4): 457-463.

6. Oldenbeuving AW, Kort PLMD, Jansen BPW, Algra A, Kappelle LJ, et al. (2011) Delirium in the acute phase after stroke: incidence, riskfactors, and outcome. Neurology 76(11): 993-999.

7. Fazekas F, Chawluk JB, Alavi A, Hurtig HI, Zimmerman RA (1987) MR signal abnormalities at 1.5 T in Alzheimer's dementia and normal aging. Am J Roentgenol 149(2): 351-356.

8. Scheltens P, Leys D, Barkhof F, Huglo D, Weinstein HC, et al. (1992) Atrophy of medial temporal lobes on MRI in "probable" Alzheimer's disease and normal ageing: diagnostic value and neuropsychological correlates. J Neurol Neurosurg Psychiatry 55(10): 967-972.

9. Marcantonio ER (2017) Delirium in hospitalized older adults. N Engl J Med 377(15): 1456-1466.

10. Schuurmans MJ, Shortridge-Baggett LM, Duursma SA (2003) The Delirium Observation Screening Scale: a screening instrument for delirium. Res Theory Nurs Pract 17(1): 31-50.

11. National Clinical Guide line Centre (UK) (2012) Delirium: diagnosis, prevention, and management of delirium. Clin Gudel 103: 512-539.

12. Adams Jr HP, Bendixen BH, Kappelle LJ, Biller J, Love BB, et al. (1993) Classification of subtype of acute ischemic stroke. Definitions for use in a multicenter clinical trial. TOAST. Trial of Org 10172 in Acute Stroke Treatment. Stroke 24(1): 35-41.

13. Palisano R, Rosenbaum P, Walter S, Russell D, Wood E, et al. (1997) Development and reliability of a system to classify gross motor function in children with cerebral palsy. Dev Med Child Neurol 39(4): 214-223.

14. Sandberg O, Franklin KA, Bucht G, Gustafson Y (2001) Sleep apnea, delirium, depressed mood, cognition, and AD Lability after stroke. J Am Geriatr 49(4): 391-397.

15. Sheng AZ, Shen Q, Cordato D, Zhang YY, Chan DKY (2006) Delirium within three days of stroke in a cohort of elderly patients. J Am Geriatr 54(8): 1192-1198.

16. Dunne JW, Leedman PJ, Edis RH (1986) In obvious stroke: a cause of delirium and dementia. Aust NZ J Med 16(6): 771-778.

17. Levy GC, Mead GE, Nicol K, Rush R, Wijck FV (2012) Delirium in acute stroke: screening tools, incidence rates and predictors: a systemic review. J Neurol 259(8): 1590-1599.

18. Fick DM, Agostini JV, Inouye SK (2002) Delirium super imposed on dementia: a systematic review. J Am Geriatr Soc 50(10): 1723-1732.

19. Mori E, Yamadori A (1987) Acute confusional state and acute agitated delirium. Occurrence after infarction in the right middle cerebral artery territory. Arch Neurol 44(11): 1139-1143.

20. Shih HT, Huang WS, Liu CH, Tsai TC, Lu CT, et al. (2007) Confusion or delirium in patients with posterior cerebral arterial infarction. Acta Neurol Taiwan 16(3): 136-142.

21. Arnold MB (1969) Emotion, motivation, and the limbic system. Ann NYA cad Sci 159(3): 1041-1058.