

Prevalence and associations of post-stroke depression

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Abstract

Objective: This study aims to investigate the prevalence of post-stroke depression in Malaysia, and to determine the associated factors. **Methods:** The study subjects consisted of consecutive stroke admissions to the University Malaya Medical Centre between April to August, 2000 who were aged 18 years above. The patients were assessed 4 to 8 weeks after stroke. Major depression was determined using the Diagnostic and Statistical Manual of Mental Disorders IV (DSM IV) criteria, Hospital Anxiety Depression Scale and functional disability was determined using Modified Rankin Scale. Site of stroke was determined from CT brain scans and clinically. **Results:** The prevalence of major depression was 36% based on DSM IV criteria. Major depression was associated with left hemisphere brain lesion ($p=0.03$), significant physical disability with Modified Rankin Scale >2 ($p=0.004$) and previous history of depression ($p=0.04$).

Conclusions: Major depression is common 4-8 weeks after stroke among Malaysian patients.

INTRODUCTION

Depression is common after stroke with quoted rates ranging from 18% to 61%.¹⁻⁴ The discrepant rates arise for various reasons. Firstly, study methods and diagnostic criteria used. For example, whether it is the use of depression scales and a depression cut off score or a semi-structured interviews with diagnostic criteria; a self-rating or observed rated scales. Other factors are the timing of evaluation, whether during acute phase or later; the setting of the study, whether it is in-patient or community based study; the number of subjects, the inclusion criteria, the study population with differences in ethnicity, demography, culture and socioeconomic status.

The pathophysiologic mechanisms of post-stroke depression are not known. Robinson and his co-workers advocated the location of cerebral lesion as the most important factors in determining post-stroke depression.^{3,5,6} Other studies failed to confirm this relationship.^{2,7-9} Disability after stroke has also been implicated in the aetiology of post stroke depression.^{7,10,11} However, some studies found only weak association between post-stroke depression and disability.^{4,12} Other risk factors being studied were: gender, age, lack of social support, dependence on others for activity of daily living, personal and family history of affective disorders, previous history of depression.

The aims of this study were to investigate the prevalence of post-stroke depression in University Malaya Medical Centre and to investigate the associated factors.

METHODS

This prospective study was carried out in the University Malaya Medical Centre, Kuala Lumpur. All consecutive stroke admissions between April to August 2000 who are 18 years old and above were included in the study. The diagnosis of stroke was according to the World Health Organization MONICA Project¹³ and The Stroke Data Bank, National Institute of Neurological and Communicative Disorders.¹⁴ Stroke was defined as rapidly developed clinical signs of focal or global disturbance of cerebral functions, lasting more than 24 hours or until death, with no apparent non-vascular cause. Subarachnoid hemorrhage and vetebrobasilar strokes were excluded. Subarachnoid hemorrhage is managed differently, has a different prognosis, and is often excluded from medical studies of stroke.^{2,15} Similarly, vetebrobasilar stroke have different mortality rates and prognosis compared to hemispheric stroke.^{2,16} Limiting the cases to hemispheric stroke is similar to other studies.^{2,17} Patients with global aphasia or had severe comprehension deficits were excluded. Data on

socio-demographics, other medical illness, past psychiatric illness and medications were collected with a standardized questionnaire. All patients received a CT brain scan.

At between 4 to 8 weeks, the following assessment battery was administered at the neurology out patient clinic. The interviewer who was blinded to the radiological or neurological findings performed the psychiatric interview. The diagnosis of major depression was based on the Diagnostic and Statistical Manual of Mental Disorders, edition 4 (DSM-IV), using the structured clinical interview for DSM-IV (SCID).¹⁸ The Hospital Anxiety Depression Scale (HADS)¹⁹, a self-rating scale was used for assessing depressive and anxiety symptoms. A cut off point of 10 or more from the total score was taken for depression or anxiety. The HAD scale was translated into Malay. It has been validated and used previously in other study.²⁰ The Modified Rankin Scale^{21,22} was used to measure disability. It is an observer-rated, global measure of handicap assessing limitation in the patients' social role. A cut off score of 3 or more was taken as having significant physical disability.

Lesion localization was determined with CT brain scan. The radiologist/neurologist who assessed the lesion localization were blinded to the psychiatric assessments. All statistical analyses were performed using the SPSS computer software. Descriptive statistics were used to summarise the data. Bivariate correlations between depression (as the dependant variable) and other variables were established using cross-tabulation analysis. Between groups comparisons were made with student's t test for continuous variables and chi-square test of independence for dichotomous variables. Test were two-tailed, with results considered significant at $p < 0.05$.

RESULTS

One hundred and fourteen patients with hemispheric stroke were identified. Of these, 21 died during admission or before follow up assessment, 22 patients were excluded because of severe aphasia and unable to do psychiatric assessment, and 21 patients defaulted follow up and could not be traced. The final study sample consisted of 50 patients. The mean age was 57.7 ± 12.3 years, the range was 21 years to 82 years. There were 31 males (62%) and 19 females (38%). The ethnic composition was: 19 Chinese (38%), 17 Malays (34%), 12 Indians (24%), and 2 others (4%). Eighty four percent was married,

10% single, 4% single and 2% divorced. Eighteen percent were professionals, 32% were skilled workers, 24% were semi-skilled or non-skilled workers, and 36% were housewives. The disability status were: No symptoms (8%), no significant disability despite symptoms, able to carry out all usual duties and activities (30%), slight disability; unable to carry out all previous activities but able to look after own affairs without assistance (22%), moderate disability, requiring some help but able to walk without assistance (22%), moderately severe disability; unable to walk without assistance, and unable to attend to own bodily needs without assistance (18%). The lesion location based on CT brain scan was: right hemisphere (40%), left hemisphere (42%), bilateral (18%). Six percent of the patients has previous history of depression.

Of the 50 patients, 18 (36%) had major depression based on DSM-IV criteria. Using the HAD scale, 20 (40%) of the patients had depressive item total score of more or equal to 10. The mean \pm SD score was 8.2 ± 4.6 with the median of 7.5.

There was no significant association between age, gender, marital status, ethnic groups and occupational status with post-stroke depression. Post-stroke depression was significantly more frequent among patients with left hemisphere lesion than those with right hemisphere lesion. Twelve out of 21 patients (57%) with left sided lesion had post-stroke depression based on DSM-IV criteria. It was 5 out of 20 patients (25%) right hemisphere lesion. Post-stroke depression was also significantly more frequent among patients with physical disability (Modified Rankin Scale of 3 or more). Eight out of 20 patients (40%) of patients with Modified Rankin Scale of 3 or more had depression based on DSM-IV criteria, whereas it was 6 out of 30 patients (20%) for those with Modified Rankin Scale of less than 3. Patients with a past history of depression were more likely to be depressed after stroke. All 3 patients who had a previous history of depression developed post stroke depression ($p = 0.042$, Fisher exact test).

DISCUSSION

This study confirms the high prevalence of depression among a cohort of Malaysian patients 4 to 8 weeks after stroke of 36%. The prevalence of post-stroke depression at about 30% was seen in other earlier studies.^{3,23,24} A previous Malaysian study on 80 patients showed a prevalence of

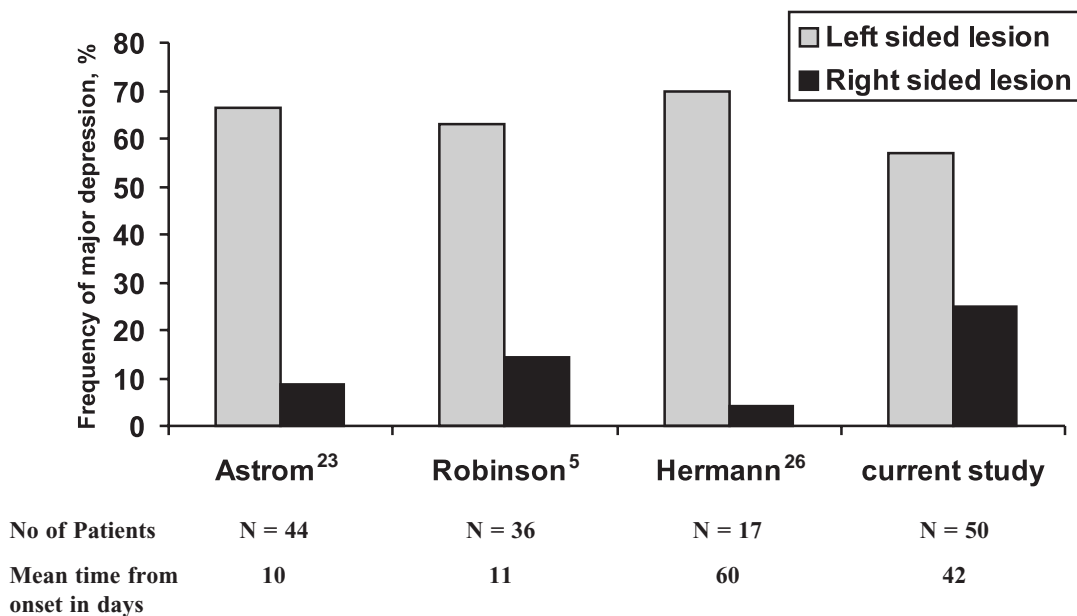
moderate to severe depression of 15%.²⁵ The study was done at 3 to 6 months post-stroke, whereas this study was done 4 to 8 weeks post-stroke. Time lapsed after stroke has been mentioned as a variable in the prevalence of post-stroke depression.^{23,26} The exclusion of a number of patients in this study as in other studies^{8, 9} because of severe cognitive or communicative deficits may contribute to an underestimate of psychiatric morbidity. However, Starkstein and Robinson³ suggested that aphasia does not cause depression, but the two may coexist. As yet, there remains no reliable method of assessing mood disorders for patients with severe comprehensive deficits.

This study also found that post-stroke depression was more frequent with left hemisphere lesion than right hemisphere lesion. This is in keeping with the results particularly by Robinson's group^{3,5} and other investigators.^{23,27} However other studies have failed to confirm this relationship.^{2,7-9} A recent review of a longitudinal study of post-stroke depression and lesion location reported that the most likely explanation for these conflicting findings is inter-study differences in the time patients were examined after stroke.²⁸ The association of left sided lesions (left frontal and left basal ganglia lesions) with depression was found only during the 2 weeks to 2 months

post-stroke period. The great majority of studies were done at 3 or more months following stroke when the frequency of depression following right hemisphere stroke was no different from that following the left hemisphere. Whereas the studies done between 2 weeks and 2 months showed that the frequency of depression was higher with left hemisphere lesion (Figure 1).^{5,23,27} An earlier study among Malaysian patients 3 to 6 months post-stroke also showed side of lesion did not impact the prevalence of depression.²⁹ In this current study, the patients were assessed between one month and two months after stroke.

Left frontal and left basal ganglia lesions may be associated with depression in the early phase of stroke, and right parietal lesions may be associated with depression in the later phase because of lateralized biochemical or neurophysiologic changes occurring in response to brain infarction.²⁸ Laboratory studies in rats and receptor imaging in humans using positron emission tomography have shown that right hemisphere lesions produce more profound decreases in norepinephrine and serotonin than left hemisphere lesions. These right hemisphere changes lead to compensatory up regulation of serotonin receptors in parietal and temporal cortex and perhaps delay the onset of depression.^{30,31} On the other hand, biogenic amine depletion is milder

Figure 1: Frequency of major depression among patients with lesions left or right hemisphere



In all the studies, the difference between frequency of major depression in patients with left and right hemisphere lesions is significant at $p < 0.05$.

following a left sided lesion but is uncompensated and leads to acute onset of depression.

This study also showed that there is a strong association between depression and functional impairment. This finding is similar to other previous studies^{7,10,11} including a study among Malaysian patients.²⁹ The nature of association between post-stroke depression and physical disability is likely to be complex. According to Sharpe³², functional impairment may cause depression, and early depression predicts later functional impairment. That is, impaired function predisposes to depression, and depression also has impact on functional recovery.

Our study showed that patients with past history of depression were more likely to be depressed after stroke. This is corroborated by other investigators.^{2,7,24} The previous episodes of depression appeared to be reactive in nature. This suggests that reactive factors is important in the pathogenesis of post-stroke depression, and that patients who develop post-stroke depression is predisposed to depression to begin with.

One of the central issues in post-stroke depression is whether it is organic or reactive in nature. The higher frequency of depression in left sided lesions support the importance of site of lesion, and thus the importance of organic factors. The relationship between disability and post-stroke depression however, support the importance of reactive factor. Perhaps the two are not exclusive. Lishman³³ suggested that reactive factors, factors related to the lesion, premorbid personality, constitution as well as environment all played a role in the development of mental disability after brain injury.

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