

Research Article

A cross-sectional study of prevalence and determinants of depression among stroke patients

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ABSTRACT

Background: The association between depression and stroke is well known. Few studies show that lesion side and site are associated with post-stroke depression (PSD), but there exists a vast discrepancy in the results among various studies. The prevalence of post stroke depression also varies widely. In India there is paucity in the amount of literature in this context. Early detection of depression is of prime importance for better outcomes. The study was mainly intended to find out these variations.

Methods: To study the prevalence of post stroke depression, the neuroanatomical correlation of post stroke depression and impact of comorbid conditions in post stroke depression. This cross sectional study was designed at medicine department of MGMCRI, Puducherry, India. All adult patients with stroke (>40 years) presenting to the emergency medical services (EMS) and department of medicine were enrolled. Patients fulfilling the inclusion criteria were taken up for the study after obtaining consent. Data about pre-existing comorbid illness such as diabetes, hypertension, ischaemic heart disease and substance abuse like smoking, alcohol use were collected. Complete physical examination and CNS examination were performed. The findings of CT brain were documented including the site of lesion. Depression was assessed on the 14th day after stroke using PHQ-9 questionnaire. Chi square and regression analysis were employed for statistical analysis.

Results: The mean age of subjects in this study was found to be 63.84±11.40 years. The prevalence of severe depression in this study was 47%. Milder form of depression was found in 53% of the subjects. Of the total population studied, statistically significant severe depression was associated with patients who had lesion on left hemisphere.

Conclusions: Post stroke depression is more associated primarily with left sided hemispheric lesions. The prevalence of significant post stroke depression in present study was 47%. This study highlights the importance of screening stroke patients for depression. Early intervention of post stroke depression can lead to better outcomes.

Keywords: Cerebro vascular accident, PSD, Diabetes mellitus, Ischaemic heart disease, Hypertension, EMS

INTRODUCTION

Stroke is the third leading cause of death and one of the most common disabling diseases, has an enormous emotional impact on both patients and their family members. Post-stroke depression (PSD) is one of the common emotional disorders afflicting stroke survivors.

Studies have reported prevalence rates that have ranged from 18% to 61%, depending upon patient selection and criteria used. Diagnosis of PSD is challenging; therefore, it often remains unrecognized. PSD is associated with cognitive impairment, increased mortality and risk of falls, increased disability, and worse rehabilitation outcome.

Some of the previous studies revealed that if the lesion was in the left hemisphere, the severity of depression was significantly higher. In a hypothesis based on CT scan report comparing both sexes, women were found to have higher rate of left hemisphere lesions and higher rate of post-stroke depression. Many studies show that in addition to the psychosocial stress, neurobiological factors such as site of infarct and brain atrophy may also be related to post stroke depression (PSD).

There are conflicting results in this area of research and paucity of such data in Indian literature. The objectives of this study are to determine the prevalence of PSD in chronic stroke survivors and to correlate the neuroanatomical localization and its relationship with comorbid conditions. The aim was to study the prevalence of post-stroke depression, to study the neuroanatomical correlation of post-stroke depression and to study the association between the comorbid illness and prevalence of post-stroke depression.

METHODS

This cross sectional observational study was done in the department of general medicine, Mahatma Gandhi Medical College and Research Institute (MGMCRI), a tertiary level health setup established in Pondicherry, India.

Inclusion criteria

About 100 patients of stroke who attended the EMS and the department of general medicine of MGMCRI during the period of March 2014 to February 2015 were enrolled.

Exclusion criteria

Aphasic patients, unconscious patient, stroke mimics and patients with previous history of psychiatric illnesses.

Procedure

All the patients admitted with stroke who satisfied the inclusion criteria were taken up for the study. The patient or relatives were informed about the procedure and an informed consent was obtained. The patients who fulfill the inclusion criteria, and were willing to participate in the study, were enrolled into the study. Upon enrolment into the study, a semi structured data collection proforma was used to record the socio-demographic details, neurological examination findings and radiological findings on CT scan. Patients were assessed for depression by using PHQ-9 questionnaire on the 14th day by the principal investigator.

Statistics

The SPSS version 19 software tool was used for the data processing. All the values were expressed as mean \pm

standard deviation unless otherwise indicated. A p-value of <0.05 was considered statistically significant.

RESULTS

Out of the total 100 patients, 68% were males and 32% were females. The Mean age of this study was found to be 63.84 ± 11.40 years of which 42 patients were below 60 years and 58 patients were above 60 years of age.

In the present study, diabetes mellitus, hypertension and Ischemic heart disease (IHD) was found in 55%, 32% and 30% patients with stroke respectively. Alcoholism was prevalent in 42% and smoking in 39% of patients with stroke. Mild depression was found in 36 (52.9%) male patients as compared to 17 (53.1%) female patients with stroke which was not found to be statistically significant. Similarly, severe depression was found in 32 (47.1%) male patients as compared to 15 (46.9%) female patients which was statistically insignificant ($p=0.986$) (Table 2).

Among 55 Diabetic patients who developed stroke, 27 (49.1%) of them had mild depression and 28 (50.9%) had severe depression ($p=0.387$). Similarly, out of 30 IHD patients who developed stroke, 15 (50%) had mild depression and 15 (50%) had severe depression ($p=0.694$) (Table 2). Out of 42 alcoholics studied, 20 (47.6%) of them had mild depression and 22 (52.4%) had severe depression ($p=0.359$). Out of 39 smokers, 24 (61.5%) had mild depression and 15 (38.5%) had severe depression ($p=0.171$) which was not found to be statistically significant.

Out of 100 patients studied, 71 patients had ischemic stroke as compared to 29 patients who had haemorrhagic stroke. Since the study was conducted in a tertiary care hospital, the incidence of hemorrhagic stroke was relatively high. Out of 71 patients with ischemic stroke, 38 (53.3%) patients had mild depression and 33 (46.5%) patients had severe depression. Similarly, out of 29 patients with haemorrhagic stroke, 15 (51.7%) patients had mild depression and 14 (48.3%) patients had severe depression ($p=0.870$) (Table 3).

Table 1: The percentage of people with different comorbid conditions.

Comorbidity	Percentage
Diabetes	55
Hypertension	32
IHD	30
Alcohol	42
Smoking	39

When analysis was done to find out the association of depression with the hemisphere affected, it was found that 24 (41.4%) patients with left sided lesion and 29 (69%) patients with right sided lesions had mild depression. The risk of mild depression was higher with right sided lesion.

Table 2: Descriptive analysis of demographic variables.

Characteristics	Mild depression	Severe depression	Chi square X ²	P-value
Gender				
All	53 (53.0%)	47 (47.0%)	0.000	0.986
Male	36 (52.9%)	32 (47.1%)		
Female	17 (53.1%)	15 (46.9%)		
Diabetes				
Absent	26 (57.8%)	19 (42.2%)	0.750	0.387
Present	27 (49.1%)	28 (50.9%)		
Total	53 (53%)	47 (47%)		
IHD				
Absent	38 (54.3%)	32 (45.7%)	0.155	0.694
Present	15 (50%)	15 (50%)		
Total	53 (53%)	47 (47%)		
Alcohol				
Absent	33 (56.9%)	25 (43.1%)	0.842	0.359
Present	20 (47.6%)	22 (52.4 %)		
Total	53 (53%)	47 (47%)		
Smoking				
Absent	24 (61.5%)	15 (38.5%)	29 (47.5%)	32 (52.5%)
Present	53 (53%)	47 (47%)		
Total	53 (53%)	47 (47%)		

Table 3: Descriptive analysis of stroke variables.

Characteristics	Mild depression	Severe depression	Chi square X ²	P value
CVA type				
Infarction	38 (53.5%)	33 (46.5%)	0.027	0.870
Haemorrhage	15 (51.7 %)	14 (48.3%)		
Total	53 (53%)	47 (47%)		
Hemisphere affected				
Left	24 (41.4%)	34 (58.6%)	7.486	0.006
Right	29 (69%)	13 (31%)		
Total	53 (53%)	47 (47%)		

Table 4: Multiple logistic regressions.

Background characteristic	Reference category	B	Exp (β)	Significance
Gender	Male			
Female		-0.131	0.877	0.790
Hemisphere	Left			
Right		-1.218	0.296	0.006
Diabetes	Absent			
Present		0.414	1.513	0.351
IHD	Absent			
Present		0.269	1.308	0.572
CVA Type	Infarct			
Haemorrhage		0.204	1.226	0.677
Hypertension	Absent			
Present		0.369	1.446	0.424
Age group	Up to 60			
Above 60		0.486	0.615	0.269

Table 5: Previous studies done during acute period after stroke.

Study done	Time after stroke	Depression Criteria	Prevalence
Ramasubbu et al	10 days	CES-D 16	26%
Townend et al	5 days	HADS > 8	16%
Caeiro et al	4 days	DSM IV-TR	46%
Present study	14 days	PHQ-9	47%

In contrary, 34 (58.6%) patients with left sided lesions and 13 (31%) patients with right sided lesions had severe depression, indicating that left sided lesions are associated with severe depression which was found to be statistically significant ($p=0.006$) (Table 3).

Multiple logistic regression analysis showed significant observation with the side of lesion ($p=0.006$) suggesting that the risk of severe depression is more with left sided lesions. Other parameters like age, gender, diabetes mellitus, hypertension, IHD, and the type of stroke did not vary significantly (Table 4).

Overall in the present study, when stroke patients were observed for the presence of depression on 14th day using PHQ-9 depression criteria, 47% patients were found to have depression (Table 5).

DISCUSSION

The study was conducted in MGMCRI, Pondicherry, and a tertiary level health care setup. Post-stroke depression was diagnosed using PHQ-9 questionnaire. Present study endorsed the fact that depression is one of the common outcome of stroke. In this study, we found that more than one third of the patients had severe depression. The prevalence of severe depression in this study was 47%. Mild depression was present in 53% of the study group. The perth community stroke study done in Australia had a post-stroke depression prevalence of 23% while the Swedish population stroke study showed a prevalence of 28%.^{1,2} An Indian study done by Vataja et al reported a prevalence of 37%.³ However all these studies are done at different time periods following stroke. All these studies indicated severe depression.

This study was done at the acute period after stroke. Some studies which were done following acute period of stroke showed similar results. Ramasubbu et al studied post stroke depression with CES-D16 score on 10th day and found that the depression was prevalent in 26% patients.⁴ Townend et al used HADS >8 score on 5th day of stroke and witnessed 16% prevalence of depression.⁵ Caeiro et al used DSM IV-TR on 4th day and witnessed 46% prevalence of depression in stroke patients (Table 5).⁶

Berg et al did a study comparing the different depression rating scales after stroke and he concluded that no

obvious variations were found between the rating scales when the patients are being evaluated at the same period after stroke.⁴ The scale which we used in this study was PHQ-9. Williams et al had evaluated the performance of PHQ-9 in assessing post-stroke depression and concluded that PHQ-9 scores discriminate equally well between those with and without PSD regardless of age, gender, or ethnicity and also it was superior to other scales used to assess depression.⁷

Demographic variables serve an important role in the development of post-stroke depression. Depressive symptoms were more prevalent among those who were below 60 years of age. Severe depression was more prevalent in this age group compared to people above 60 years of age. However most of the studies done on significance between age and post-stroke depression gave contradictory findings and reveals the complex relationship between age and post-stroke depression, which could be dependent on various other factors.^{8,9}

Regarding gender, this study showed no significant variation in the prevalence among males and females. The severity of depression was found to be a little higher in male patients. One reason that could be attributed for this might be the physical disability in that group is of greater importance for male as compared to female. Another reason could be due to the less coping abilities as compared to females.⁴ When considering India, post-troke depression can also be attributed to the cultural norms as they have high level of responsibilities and expectations. Males are responsible for most of the earning in the family and in such scenario, physical impairment carries a higher risk in developing depression.

In terms of stroke related factors, ischaemic stroke was associated with more depression but was not statistically significant. The amount of people presenting with ischaemic stroke were significantly high when compared to that of those with haemorrhagic stroke. This finding was consistent with that of the previous studies.¹⁰

In this study, the site of the lesion had an influence in the development of depression. Patients with lesions on the left hemisphere had severe depression compared to that of those with right sided lesions. Many previous studies done showed lesions on the left side are associated with severe depression. Recent studies show that MRI has greater accuracy than CT, and frontal subcortical circuits are recognized as the neuroanatomical substrate of much

of the depression syndrome.³ However the patients studied in this study had only CT for imaging of brain. Depression was associated with more severe stroke, particularly in vascular territories that supply limbic structures.¹¹ A study done in Karnataka by Pooja et al showed increased prevalence of depression following stroke when the lesion was in left hemisphere.¹² There is significant inverse correlation between severity of depression and distance of the lesion from the frontal pole with left hemisphere stroke, when compared to right hemisphere stroke.¹³ In a study done in Finland by Vataja et al, infarcts within critical anatomical substrates of the prefrontal-subcortical circuits, namely the caudate and pallidum are associated with PSD. When both hemispheres were analyzed separately, the lesions affecting these structures on the left side were associated with PSD, whereas right-sided lesions were not.³ Some studies found relationships between PSD and various stroke sites: posterior strokes, infra-tentorial lesions, and basilar infarcts. However, most studies did not find any relationship between stroke site and PSD. In summary, lesion side and site are not clearly associated with post-stroke depression. However, recent MRI studies have provided data that suggest the involvement of the subcortico-frontal system and left sided lesions in post-stroke depression.³

Diabetic patients with stroke had 1.4 times more chance to develop depression while that of patients with IHD had 1.2 times more chance in developing post-stroke depression. No significant results were found with smokers and alcoholics in this study. There was no significant correlation between the comorbid illness and the development of depression in this study.

CONCLUSIONS

The prevalence of severe depression in this study was 47%, milder form of depression was found in 53% of the subjects. Severe depression was found in patients who had lesion on left hemisphere. Diabetic patients with stroke had 1.4 times more risk of developing post stroke depression while that of patients with IHD had 1.2 times higher risk. This study highlights the importance of screening stroke patients for depression. Early intervention of post stroke depression can lead to better outcomes.

Present study has several limitations. As this study was cross sectional study, the follow up of patients was not possible in our setup. The sequence of severity of stroke following various time intervals could not be measured in our study. The study was limited to one hospital which might be biased in stroke type and demographic characteristics of the patients. The entire sample did not include people with previous history of psychiatric illness and hence the results cannot be generalized to stroke patients having any cognitive and psychiatric impairment.

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