A COMPUTERISED AXIAL TOMOGRAPHIC STUDY OF POSTSTROKE MAJOR DEPRESSIVE DISORDER.

RAJEEV KUMAR, SUNIL DATTA, CHANDRAN GNANAMUTHU, K KURUVILLA

ABSTRACT: 32 right handed patients who had developed stroke within six months prior to the study and were free from aphasia and impaired level of consciousness were subjected to detailed neurological and psychiatric evaluation. 30 of them also had CT scan of brain. 9 among the 32 patients (28.1%) had major depression as per DSM III R criteria and 5 among them (15.6%) fulfilled the criteria for major depression with melancholia. Occurrence of depression was not related to the age or sex of the patient or duration or type of stroke. Radiological evidence for stroke was present in 25 out of the 30 who had CT Scan. Though there was no correlation between presence of depression and the involvement of a particular hemisphere, MDD was more prevalent in those who had left frontal and right or left subcortical lesions.

Key words: Stroke, major depressive disorder, melancholia, CT Scan.

INTRODUCTION

It is well recognized that depression is frequently associated with cerebrovascular disease or stroke. Stroke is defined as rapidly developing clinical signs of focal or global disturbance of cerebral function lasting more than 24 hours or leading to death, with no apparent cause other than of vascular origin (WHO, 1978). Kraepelin noted that diagnosis of states of depression is frequently complicated by accompanying arteriosclerotic disease, because sometimes such disease is an accompanying phenomenon of manic depressive insanity but at other times may itself engender a state of depression. Bleuler observed that after cerebrovascular infarction, melancholic moods lasting for months, and sometimes longer, appear frequently. Adolf Meyer reported on clinical differences in the presentations of traumatic insanities depending upon the specific locations and causes of brain injury.

It was suggested initially that depression due to brain damage was reactive and understandable. However, systematic studies of depression and stroke have consistently found that severity of depression is not closely related to severity of physical impairment (Folstein et al 1977; Robinson et al 1983 Sinyor et al 1986), thereby indicating that other correlates of poststroke depression deserve examination.

There have been attempts to correlate poststroke depression with location of lesion. These studies provide insight into the neurobiology of functional depression. So it was felt that evaluation of clinical population of stroke patients for depression and correlation with location of lesion will be useful especially in view of dearth of data in this regard from India. Depression after stroke is a clinically relevant subject because depressed patients benefit less from physical rehabilitation than do non depressed patients (Sinyor 1986, Labi 1980).

AIMS OF THE STUDY

1. To estimate the prevalence of major depression (DSM III R) in poststroke patients.
2. To evaluate the correlation between poststroke major depression and site and side of lesion using CT scan.

MATERIALS AND METHODS

Over a ten month period (from Oct. 1991 to Aug. 1992) 39 stroke patients admitted in the neurology ward of CMC Hospital, Vellore were screened. Patients admitted for acute stroke, and patients whose stroke had occurred within 6 months of the time of study were included. Patients who had aphasia, and impaired level of consciousness were excluded. A total of 32
patients survived these exclusion criteria, of whom, 27 had thrombo embolic strokes and five had hemorrhagic strokes.

PSYCHIATRIC AND NEUROLOGICAL EXAMINATION

The neurological examinations and diagnosis were made by a neurologist initially and repeated by the investigator and relevant neurological signs and symptoms were entered into a specially designed proforma. After obtaining consent from the patient, all the patients were administered a Mini Mental State Examination prior to any procedure. A detailed psychiatric examination was done for all patients. Examinations were conducted between 11 am and 2 pm in order to minimise any possible effect of diurnal mood variation. Using a DSM III R symptom criteria checklist patients were screened for major depression with and without melancholia. The Hamilton depression rating scale was administered by the investigator for all patients.

ANALYSIS OF CT SCAN

CT scan of the brain was used to assess the site of lesion and it was reported by an experienced radiologist, who was blind to the diagnosis of depression. Except two patients all patients has CT scan of the brain. Out of 30 patients 5 patients were reported to have negative findings in the CT scan. The site of the lesion was determined clinically and radiologically for 25 patients, only clinically in 7 patients. The SPSS PC statistical package was employed to analyse the data. The chi-square test, student-test and Fishers exact test were used to compute statistical significance.

RESULTS

STUDY POPULATION

32 patients were included in the present study. Background characteristics are shown in table 1. Nine patients fulfilled the criteria for major depression according to DSM III R criteria and 23 patients did not. Both groups were matched for age and sex. There were no statistically significant differences in the background characteristics between the depressed and non depressed group. When the patients were classified into two groups based on duration of stroke (Group I = < 30 days; Group II = 30 days), there was no correlation between major depression and duration of stroke. (See Table 2a). Table 2b shows relationship between duration of stroke and major depression with or without melancholia.

TABLE - 1 BACKGROUND CHARACTERISTICS OF STUDY POPULATION

|                        | Depressed Group (MDD) | Non Depressed Group (n = 23) | Total (n = 32) |
|------------------------|-----------------------|-------------------------------|---------------|
| Age Mean ± SD          | 51.78±16.77           | 5.91±15.34                    | 51.2±15.5     |
| Sex                    |                       |                               |               |
| Female (n%)            | 4(44.4)               | 10(43.5)                      | 14(42.8)      |
| Male                   | 15(55.6)              | 13(56.5)                      | 28(56.2)      |
| Marital Status         |                       |                               |               |
| Single                 | 1(11.1)               | 1(4.3)                        | 2(6.3)        |
| Married                | 6(66.7)               | 27(91.4)                      | 33(104.4)     |
| Widowed                | 2(22.2)               | 4(14.3)                       | 6(18.8)       |
| Socio economic Status  |                       |                               |               |
| Lower                  | 0(0)                  | 3(13)                         | 3(9.4)        |
| Middle                 | 0(0)                  | 18(78.3)                      | 18(81.3)      |
| Upper                  | 1(11.1)               | 2(8.7)                        | 3(9.4)        |
| Domicile (% Rural)     | 4(44.4)               | 3(13)                         | 7(21.9)       |
| Tobacco use            | 2(22.2)               | 7(30.4)                       | 9(28.1)       |
| Alcohol use n%         | 1(11.1)               | 1(4.3)                        | 2(6.3)        |
| Family History         | 1(11.1)               | 0(0)                          | 1(3.1)        |
| of psychiatric illness |                       |                               |               |
| Past History of        | 0(0)                  | 1(4.3)                        | 1(3.1)        |
| psychiatric illness n% |                       |                               |               |
| Past History of stroke | 2(22.2)               | 0(0)                          | 2(6.3)        |
| medical illness n%     |                       |                               |               |
| Past History of stroke | 6(66.7)               | 16(69.6)                      | 22(68.8)      |
| (Days) Mean±SD         | 53±66                 | 42±52.5                       | 95±56.3       |
| Time from stroke to CT | 29±50.9               | 30.7±6                        | 29.7±6        |

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TABLE 2a
RELATIONSHIP BETWEEN DURATION OF STROKE AND MAJOR DEPRESSION

| Time  | Major Depression | Non-depressed group | Total |
|-------|------------------|---------------------|-------|
| < 30 days | 6                | 16                  | 22    |
| > 30 days | 3                | 7                   | 10    |

Fisher's Exact Test: \( P = 0.59 \) (1 tailed), \( P = 1 \) (2 tailed) (NS)

TABLE 2b
RELATIONSHIP BETWEEN DURATION OF STROKE AND SUBTYPES OF MAJOR DEPRESSION (MDD)

| Subtypes of MDD | Duration (Days) Mean + SD |
|-----------------|---------------------------|
| 1. MDD with Melancholia | \( n = 5 \), 42.8 + 50.62 |
| 2. MDD without Melancholia | \( n = 4 \), 99.5 + 93.39 |

1 - t Test \( z = 1.11 \) (NS)

TABLE 3
NEUROLOGICAL FINDINGS

| Neurological Findings | Depressed Group (MDD) n=9 (NS) | Non-depressed Group n=23 (5) |
|-----------------------|-------------------------------|-----------------------------|
| 1. Homonymous hemianopia | 2(22.2)                      | 4(17.4)                     |
| 2. Dysarthria         | 6(66.7)                      | 12(52.2)                    |
| 3. Motor deficits     | 9(100)                       | 21(91.3)                    |
| 4. Sensory deficit    | 6(66.7)                      | 10(43.5)                    |
| 5. Cerebellar signs   | 2(22.2)                      | 3(13.0)                     |
| 6. Type of stroke     | Thromboembolic 7(77.8)       | 20(84.4)                    |
|                       | Haemorrhagic 2(22.2)         | 3(13.0)                     |

Not Statistically significant

NEUROLOGICAL FINDINGS

Neurological findings in depressed and non-depressed groups are shown in Table 3. 27 patients had thromboembolic strokes and 5 patients had haemorrhagic strokes. The two groups did not differ significantly in the neurological deficits.

TABLE 4
DSM III R DIAGNOSTIC CATEGORIES

| Diagnosis                                      | n = 32 (\%) |
|------------------------------------------------|-------------|
| 1. Major depression with melancholia          | 5 (15.6)    |
| 2. Major depression without melancholia       | 4 (12.5)    |
| 3. Manic episode                              | 1 (3.1)     |

PSYCHIATRIC DIAGNOSES (See Table 4)

Of the 32 patients 5 (15.6%) met the DSM III R criteria for major depression with melancholia, 4(12.5%) met criteria for major depression without melancholia and 1(3.1%) met criteria for manic episode.

RELATIONSHIP BETWEEN MAJOR DEPRESSION & LOCATION OF LESION

The location of lesion was based on the reading of the CT scan by a radiologist. CT scans were available for 30 patients. Five patients were reported to have negative findings. For total of 25 patients with positive findings the relationship between major depression and site of lesion was assessed. The involved hemisphere was assessed clinically and radiologically in 25 of the patients, and clinically alone in 7 patients, 5 of whom had negative radiological findings and 2 of whom had no scan done. All patients were right handed and lesion was restricted to a single hemisphere. The correlation between major depression and hemisphere involved is shown in Table 5. This was not found to be statistically significant.
TABLE 5
RELATIONSHIP OF SIDE OF LESION & POSTSTROKE MAJOR DEPRESSION

| Involved hemisphere | Major depression | Non depressed |
|---------------------|------------------|--------------|
| RIGHT               | 5(55.6)          | 8(34.8)      |
| LEFT                | 4(44.4)          | 15(65.2)     |

* All patients were right handed
Not significant.

TABLE 6
RELATIONSHIP BETWEEN SITE OF LESION AND MAJOR DEPRESSION (MDD)

| Site of lesion       | MDD     | Non depressed | Total |
|----------------------|---------|---------------|-------|
|                      | N=8(%)  | n=17(%)       | n=25(%) |
| 1. Frontal & Subcortical | 6(75)   | 5(29.4)       | 11(44)  |
| 2. OTHERS (TEMPOROPARIETAL * OCCIPITAL) | 2(25)   | 12(70.4)      | 14(56)  |

* Fishers exact test P <0.05 Significant
* 7 Patients excluded
   (2 patients no CT scan taken and 5 negative)

The relationship of site of lesion and MDD is shown in Table - 6. There were two patients each of whom had a single lesion in the left frontal lobe and both developed major depression of which one was melancholic type. None of the patients who had lesion in the occipital lobe ( 1 right and 1 left) developed depression. 12 patients had lesion in the temporoparietal area. Out of this, two developed depression ( 1 major depression with melancholia and 1 without melancholia). Both had right hemispheric lesion. There were 9 patients who had lesion in the subcortical area of which four patients developed depression. Two of the patients had melancholia associated with left hemispheric lesion. Of the two patients without melancholia, one showed right sided lesion and one showed left sided lesion. One other patients who developed melancholia revealed a negative study in the CT scan. In summary, the occurance of MDD was high in patients who had left frontal (two patients) and 50% of patients who had subcortical lesion. This was found to be statistically significant (Fishers exact test P <0.05).

DISCUSSION

The present study was conducted to 1. estimate the prevalence of major depression (DSM III R) in stroke patients. 2. to evaluate the correlation between poststroke major depression and site and side of lesion using CT scan. 28.1 percent of the total stroke patients demonstrated symptom clusters associated with major depression. When the background characteristics and neurological findings of the depressed and non depressed group were compared there was no statistically significant differences between the two groups. This is consistent with previous studies (Starkstein 1988, Parikh 1990). Both groups in the present study were matched for age and sex. Previous systematic studies of depression and stroke have consistently found that severity of depression is not closely related to severity of physical impairment (Folstein 1977. Robinson 1983a. Sinyor 1986a). Though the present study does not address this issue specifically, it was found that there is no positive correlation of major depression and the time elapsed since the onset of stroke, because the length of time since the onset of the stroke may be used as a measurement of patient's physical impairment. We also found no significant correlation between chronic medical illnesses such as diabetes mellitus and hypertension etc. and poststroke major depression. There are few studies in which an operationalised criteria was used for diagnosis of depression in stroke patients. 15.6% of the total patients showed features of
POSTSTROKE DEPRESSIVE DISORDER.

None of the previous studies have examined the rate of subtypes of major depression. This study has specifically addressed itself to this issue. The present study did not show any significant correlation between poststroke major depression and hemisphere involved. This was consistent with findings of previous study (Folstein et al 1977, Sinyor et al 1986a, Ebrahim 1987). However, others have reported lateralised emotional response to brain injury (Gasparrini 1978). This issue of correlation has not been settled as yet. Starkstein and Robinson (1988) have suggested that a number of other variables like time poststroke, diagnosis of depression prior brain injury, intra hemisphere location of lesion and poststroke major depression (Robinson et al 1984, Starkstein et al 1987). We have seen that both patients who had left frontal lobe lesion developed major depression whereas neither of the patients with lesion in occipital lobe (n=2) developed. 50% of the patients who had lesion in the subcortical area developed major depression. It is well documented in literature that poststroke major depression was significantly more frequent among patients with left anterior lesions (Robinson et al 1983b, 1984, Lipsey et al 1983). Strakstein and colleagues extended these findings to show that depression is more common in patients with left anterior lesions in both cortical and basal ganglia (Starkstein et al 1987). The findings in the present study cannot be generalised in our population because of the small number of the patients. As mentioned earlier there are a few limitations for the present study. First, the number of patients studied was relatively small, thereby making it difficult to generalise the findings. Secondly, exclusion of patients with aphasia and severe comprehension deficit might have produced a sampling bias.

CONCLUSION

The objective of the study was to (1) estimate the prevalence of major depression (DSM III R) in stroke patients (2) to evaluate the correlation between post stroke major depression and site and side of lesion using CT scan. 28.1% of the total stroke patients demonstrated symptom clusters associated with major depression. 15.6% of the total patients showed features of melancholia. The present study did not show any significant correlation between post stroke major depression and hemisphere involved. Occurrence of major depression was high among patients who had left frontal and either left or right subcortical lesions. Delineation of such a homogenous group will have significant relevance in research and pharmacological management of such cases.

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