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Original Research Article

Assessment of epidemiological factors and clinical profiles of cerebral infarction cases in tertiary health center in southern Maharashtra and hence evaluating computed tomography as its diagnostic modality: a prospective study

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ABSTRACT

Background: Cerebrovascular accidents are one of the leading causes of death in developed countries. The advent of CT in early 1970s greatly facilitated the diagnosis and management of stroke. The present study aims at assessing epidemiological factors and clinical presentation of cerebral infarction cases and hence to evaluate computed tomography as a diagnostic tool for cerebral infarction.
Methods: A prospective study was carried out among cases of Cerebral infarction. Every patient was interviewed personally, and detailed history was taken followed by clinical, systemic and neurological examination. Results were analysed comparing clinical diagnosis, sites of lesions, nature of lesions and CT scan findings.
Results: Cases showed male predominance with 69% cases and 31% were females. 19% cases presented with headache, 17% with convulsions and 9% with vomiting. Upon eliciting past history of cases, we found that 48% were known cases of hypertension, 23% were having past history of cerebrovascular episodes, 20% cases were smokers and tobacco chewers whereas 15% were known cases of diabetes mellitus.
Conclusions: Currently India is facing double burden of communicable and non-communicable diseases, and now a day's cases of non-communicable diseases have started increasing, following iceberg phenomenon. So, diagnosing these conditions in its initial stage and halting the disease progress will be the priority. The present study recommends a comprehensive model for non-communicable disease prevention and control based on current healthcare needs and disease scenario.

Keywords: Cerebrovascular accidents, Cerebral infarction, Computed tomography, Non-communicable diseases

INTRODUCTION

WHO defined Cerebrovascular accidents or stroke as "An acute loss of focal and at times global cerebral function, the symptoms lasting more than 24 hours or leading to death with no apparent cause others than of vascular origin".[1] Cerebrovascular accidents (CVA) are on the leading causes of death in developed countries after heart disease and cancer and also become one of the leading causes of death in India.[1] In Indian hospitals, stroke accounts for 4.5% total medial admissions and about 30% of neurological admissions.[2]

In addition to be a leading source of mortality, cerebrovascular disease is also a significant cause of morbidity.[3] Although the prevalence of stroke appears to

be comparatively less common in India, but it is proportionately increasing with increasing life expectancy in India.[4]

Stroke, or cerebrovascular accident, is characterized by the onset of neurological symptomatology that most often includes hemiparesis, aphasia or hemianopia (paraparesis is not typical for stroke and suggests an ischemic lesion in the spinal cord or other non-ischemic etiology).[3] Stroke can be generally classified as ischemic or hemorrhagic. Hemorrhagic stroke, which is due to blood vessel rupture, accounts for 20% of CVAs. Ischemic stroke due to brain vessels occlusion and blockage includes 80%.[5]

Treatment strategies for these two subtypes of stroke are markedly different, and the early diagnosis of stroke as well as determination of the subtype is an important early step in stroke management.[3] About 15 to 30% of patients die with each episode of cerebral infarction and 16 to 80% with cerebral hemorrhage. Those who survive are usually left with permanent disability, Thus, stroke becomes a great medical and social problem.[6] The advent of CT in early 1970s greatly facilitated the diagnosis and management of stroke and added significantly to our understanding of pathophysiological brain alterations in case of humans.[6] The introduction of computed tomography (CT) to clinical practice has had a great impact on our knowledge of cerebrovascular disorders, and cerebral CT has become the most commonly used primary radiologic investigation for stroke.[7] Cranial computerized tomography has revolutionized the diagnostic approach to cerebrovascular diseases, particularly by its ability to distinguish between infarction and hemorrhage and to detect non vascular causes which mimic vascular lesions. Early signs corresponding to acute ischaemic signs can be demonstrated with great accuracy by experienced readers using CT imaging techniques.[8]

The present study aims at assessing epidemiological factors and clinical presentation of cerebral infarction cases and hence to evaluate computed tomography as a diagnostic tool for diagnosis of cerebral infarction.

METHODS

A prospective study was carried out in a tertiary health care centre in Southern Maharashtra during a period of September 2016 to August 2017, among 64 cases of cerebrovascular accidents with probable diagnosis of Cerebral infarction who could undergo computed tomography scan. Cases of transient ischemic accidents were excluded.

Every patient was interviewed personally, and detailed history was taken followed by clinical, systemic and neurological examination. Results were analysed comparing clinical diagnosis, sites of lesions, nature of lesions and CT scan findings.

Clinically Cerebral infarction was diagnosed in patients with sudden onset or slowly progressive neurological deficit that persisted, and such a deficit was attributed to occlusion of a part of circulation, with following features.

- History of hypertension, diabetes mellitus, angina pectoris, a previous stroke or T.I.A., myocardial infarction within previous six months,
- Consciousness on examination, relatively normal blood pressure, unilateral extensor plantar, Lack of symptoms of raised intra cranial tension at onset,
- Cardiac murmurs, cardiomyopathy or cardiac failure or cardiomegaly on chest r-ray.

All the patients were followed up till they were either discharged on operated upon. The data was entered to prepare a master chart, to study all the findings using Microsoft Excel software and all the clinical findings, CT scan findings were compared, and the data was analyzed with the help of appropriate statistical method using Microsoft Excel software.

RESULTS

The prospective study was done among 64 confirmed cases of cerebrovascular accidents with probable diagnosis of cerebral infarction, in a tertiary healthcare center in southern Maharashtra. Out of 64 patients of cerebral infarction, 44 (69%) were males and 20 (31%) were females (Table 1, Figure 1). Table 1 shows age-wise and gender-wise distribution of cases, showing more than 70% cases were presented after the age of 50 years.

Table 1: Distribution of cerebral infarction cases according to age and sex.

Age group	Male cases (%)	Female cases (%)	Total cases (%)
< 40 years	4 (9)	3 (15)	7 (11)
41-50	2 (4.5)	3 (15)	5 (7.8)
51-60	13 (29.5)	2 (10)	15 (23.3)
61-70	15 (34)	10 (50)	25 (39)
> 70	10 (23)	2 (10)	12 (18.7)
Total	44 (100)	20 (100)	64 (100)

When we tried to assess modes of presentation of cerebral infarction, we found that 17% cases were presented in drowsy state whereas 13% cases presented in unconscious state (Table 2).

Table 2: Distribution of cerebral infarction cases according to levels of consciousness.

Levels of consciousness	Number of cases	%
Conscious	45	70
Drowsy	11	17
Unconscious	8	13
Total	64	100

19% cases presented with headache, 17% with convulsions and 9% with vomiting (Table 3).

Table 3: Distribution of cerebral infarction cases according to various modes of presentations.

Modes of presentations	Number of cases	%
Headache	12	19
Vomiting	6	9
Convulsions	11	17
Total	64	100

When we assessed cases according to their systolic blood pressure (SBP), we found that significantly larger number of cases presented with systolic blood pressure between 120 to 160 mmHg (Table 4). We also found that significantly larger number of cases presented with diastolic blood pressure (DBP) less than 100 (Table 5).

Table 4: Distribution of cerebral infarction cases according to their systolic blood pressure (SBP) at the time of admission.

Systolic blood pressure (SBP) range	Number of cases	%
Less than 140	24	37.5
140-160	22	34.37
160-180	9	14
180-200	4	6.25
200-220	3	4.68
More than 220	2	3.1
Total	64	100

Table 5: Distribution of cerebral infarction cases according to their diastolic blood pressure (DBP) at the time of admission.

Diastolic blood pressure (DBP) range	Number of cases	%
Less than 100	40	62.5
100-110	9	14
110-120	9	14
120-130	6	9.5
More than 130	0	0
Total	64	100

When we tried to assess cases of cerebral infarction with various examinations, we found that 25% of cases presented with grade I-II fundal changes in ocular examination, 20% with bilateral extensor plantar, 9% cases with absent light reflex whereas 8% cases presented with neck rigidity (Table 6).

Upon eliciting past history of cases, we found that 48% were known cases of hypertension, 23% were having past history of cerebrovascular episodes, 20% cases were smokers and tobacco chewers whereas 15% were known cases of diabetes mellitus (Figure 2).

Table 6: Distribution of cerebral infarction cases according to their various examination findings.

Examinations	Findings	Number of cases	%
Fundal changes	Grade I-II	16	25
	Grade III-IV	10	16
Pupils	Anisocoria	3	5
	Absent light reflex	6	9
Plantar reflex	Bilateral plantar extensor	13	20
Signs of meningeal irritation	Neck rigidity	5	8

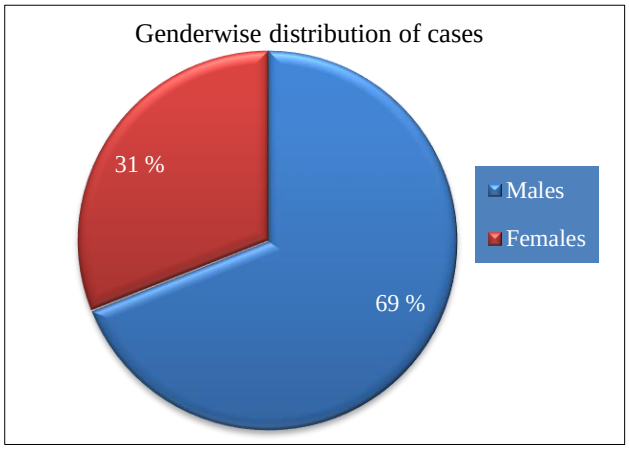

Figure 1: Distribution of cerebral infarction cases according to their gender.

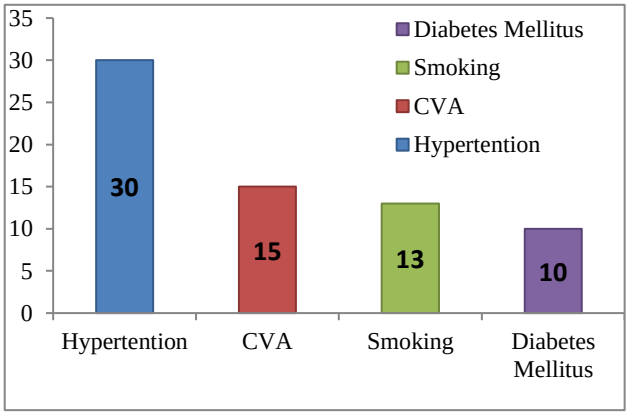

Figure 2: Distribution of cerebral infarction cases according to their past history.

DISCUSSION

In this prospective study among 64 cases of cerebral infarction, we found more percentage of cases among males above the age of 50 years. Study done by Lokesh Kumar T. also found similar findings. They found maximum cases among males above age of 50 years with peak after 60 years.[2] We found male preponderance in cerebral infarction cases, which suggests that men have

more risk factors for CVA such as hypertension and diabetes mellitus than women. We also found 20% prevalence of smokers in our cases, we think that men are more involved in high-risk habits such as smoking and alcoholism, and probably work harder under stressful conditions. These factors are closely associated with hypertension and other cardiac diseases. Also 48% cases were known cases of hypertension, which may elicit CVA. Lokesh Kumar T. et al also found similar findings in their study.[2] Eapen RP et al also found associations of stroke with risk factors such as smoking, hyperlipidemia, hypertension, diabetes mellitus and alcoholism etc.[4]

When patient presents with neurodeficit, headache, vomiting and altered sensorium, it is important to know the nature and site of the lesion. Similar findings were noted by Massaro AR et al in their study, they found severe headache (10%), vomiting (5.6%), seizures (2%) with 68% history of hypertension, 26% history of diabetes mellitus and 26% cases were havinf previous history of stroke.[9] Haghighi et al also found 28% cases with severe headaches, 27% with agitation, 5% with seizures, 18% with eye gaze impairment.[10]

It is also equally important to exclude hemorrhage in patients who are on anti-coagulants or the one who is considered for endarterectomy. If infarct is hemorrhagic, anti-coagulants are unsafe. In non-hemorrhagic infarcts anti-coagulants are indicated but risk of converting it into hemorrhagic infarcts exists, which may be over weighed against consequent risk of embolization.

Before the advent of CT scan and in places where CT scan is not yet available, physicians were mainly dependent on the history, physical findings and the Allen's method of scoring to differentiate between hemorrhage and infarct using this scoring system.[2] Since this scoring method was based upon history given by patient or relatives, it was not 100% specific. In our study, we found that out of 64 confirmed cases of cerebral infarction, computed tomography could be able to pick 65 cases (one false positive). So, chances of getting false negative cases reduces extremely, which identifies CT scan as a trustworthy diagnostic modality in cases with CVA where accurate diagnosis, location of lesion, finding nature of lesion is of utmost importance in order to initiate management protocol. Harring et al., found that in a recent series of patients with MCA territory infarctions the incidence of positive findings was 68% in cerebral CT scans performed within 2 hours of stroke onset increasing to 89% within 3 hours, thus emphasizing the great value of emergency cerebral CT scanning in acute stroke management.[11] We have also found majority of cases were related with particular pattern of blood pressure (SBP between 120-160 and DBP below 100). Similar findings were noted by Massaro et al in their study, they found that cerebral infarction cases were associated with SBP less than 160 and DBP 92.[9] So, our study suggests that hypertensive emergencies are unlikely to be associated with cerebral infarction.

Detection of early CT findings in acute ischemic stroke has proved to be of prognostic value in the evaluation of these patients. The use of CT coupled with early acute phase therapy of stroke such as thrombolytic therapy has been shown to improve outcome in acute stroke patients.[11]

CONCLUSION

Currently India is facing double burden of communicable and non-communicable diseases, and now a day's cases of non-communicable diseases have started increasing, following iceberg phenomenon. So, diagnosing these conditions in its initial stage and halting the disease progress will be the priority. The present study recommends a comprehensive model for non-communicable disease prevention and control based on current healthcare needs and disease scenario.

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