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A Study Onclinical Profile of Stroke in Very Elderly

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Abstract:
Background:*The incidence of stroke and level of poor outcome after stroke (in terms of disability and mortality rate) both increase with age. With the growth of the global elderly population, the prevalence of stroke will also rise.*
Objective of the study: *To examine demographic characteristics, clinical features, neuroimaging data, andoutcome of all first ever stroke events occurring in individuals aged 75 years or older.*
Methods:*This is a retrospective study of all first ever437 stroke patients referred to neurology department over 1-year. Data iscollected from hospital-based stroke registry.For the purpose of this study, very old patients (aged 75 years or older) were selected (n = 100). The data of very old stroke patients were compared withthe data of patients younger than 75 years of age (n = 337). The data is analysed using SPSS version 21.0.*
Results: *Mean ages and sex ratios (women/men) were 79.7±5.2 and 61.4±11.4 years and 1.63 and 0.71 for the older and younger groups, respectively.*
Elderlypatients showed a significantly lower proportion of diabetes (17% versus 30.8%) and smoking (3% versus 15.5%) and a higher proportion of peripheral artery disease (16% versus 6.8%) and atrial fibrillation (17% versus 6.8%). Hypertension was the commonest risk factor in the 2 groups. There were no significant differences in ischemicstroke subtypes between the 2 groups.Acute stroke in the very old patients was more severe than in patients younger than 75 years of age, with greater rates of in-hospital mortality (22% vs. 12.6%,), longer duration of hospital stay (14.8±9.2 vs. 9.2±7.2 days), and lesser frequency of absence of neurologic deficit at the time of hospital discharge (15.5% vs. 26.2%).
Conclusion: *Very old patients with acute stroke showed a differential clinical profile, differentfrequency of risk factors, and a poorer outcome compared with stroke patients who wereyounger than 75 years of age. Clinical and neuroimaging factors that are indicative of the severityof stroke and that were available at the time of the initial diagnosis and at the time of thedevelopment of cardiac and respiratory complications showed a predominant influence on in-hospitalmortality and may help clinicians to establish prognosis more accurately.*
Keywords: *Stroke in elderly, Ischemic stroke, Stroke in young*

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I. Introduction

Stroke mostly occurs in elderly people and patient outcomes after stroke are highly influenced by age. A better understanding of the causes of stroke in the elderly might have important practical implications not only for clinical management, but also for preventive strategies and future healthcare policies.

Approximately 16 million first-ever strokes occur worldwide annually, with a death toll of 5.7 million people per year.[1] Stroke is ranked as the second most common single cause of death in the developed world after ischemic heart disease, or the third largest killer when neoplastic diseases are considered as a group. In addition, stroke is the largest cause of adult disability, with up to half of all patients who survive a stroke failing to regain independence and needing long-term health care.[2] Stroke can affect individuals of any age, although the incidence and prevalence of this condition increase sharply with age. Indeed, age is the most important non modifiable risk factor for all stroke types, including ischemic stroke. For each successive decade after the age of 55 years, the stroke rate doubles in both men and women.[3] With increasing life expectancy, old people will constitute the majority of stroke victims. We present the stroke study focusing on very old patients in a teaching hospital from South India.

Several aging-related changes in the brain have been identified that are associated with an increase in vulnerability to ischemic stroke in the elderly.The neuronal atrophic changes that begin during midlife are accompanied by glial cell changes, which include white matterdegeneration as well as astrocytic and microglial hyperactivity. White matter mostly consists of myelinated axons, through which messages pass between various

areas of gray matter. Moderate to severe changes in white matter occur in up to one-third of people aged 65-84 years and are termed leukoaraiosis.[4] On CT, leukoaraiosis is characterized by patchy or confluent periventricular and subcortical areas of low density, while on MRI areas of leukoaraiosis have high signal intensities.[5] In elderly people, leukoaraiosis has been shown to predict decline in motor performance, the onset of dementia, and rapid global functional decline. [6] Furthermore, leukoaraiosis has been seen in up to 44% of patients with stroke or transient ischaemic attack (TIA), and the degree of leukoaraiosis correlates with the risk of recurrent stroke. [7]

Furthermore, risk factor profiles for stroke and mechanisms of ischemic injury differ between young and elderly patients.Several age-related changes in white matter might contribute to the increase in vulnerability of axons to ischemia. A drop in Na+-K+-ATPase performance in the brains of old rats compromised the ability of aging axons to maintain membrane properties and, as a result, caused white matter to be highly vulnerable to ischemia.[8] In old mice, white matter showed a twofold increase in GLT1 (the main transporter that removes glutamate from the extracellular space) gene expression and protein levels, which indicated an increase in glutamatergic signaling. Indeed, the level of glutamate release was shown to increase in the striatum and hippocampus of old rats. High levels of glutamate can cause excitotoxicity (and, hence, cell death) by triggering an influx of calcium ions into cells. Calcium ion blockage led to an improvement in white matter function in young adult mice but did not ameliorate injury in old animals,[9] suggesting a calcium-independent mechanism of excitotoxicity in aged white matter.

II. Aim Of The Study

To examine demographic characteristics, clinical features, neuroimaging data, and outcome of all first ever stroke events occurring in individuals aged 75 years or older

III. Materials Andmethods

This is a retrospective study of 437 consecutive cases referred for stroke to neurology department over 1-year. The case notes of the patients were retrieved from the medical record department of the hospital and relevant data extracted and analyzed. We divided patients in 2 groups. First group (Group-1) was consisting of very elderly patients (age >75 years), second group (Group-2) was consisting of younger patients (age <75 years). We focused on risk factors, neurological presentation, pattern of brain strokes, and prognosis in both the groups. Now onwards we will address very elderly patients group as group-I and younger patient group as group-II in this study.

Inclusion criteria: 1) All patients above age 18 years & having clinical & CT/MRI confirmed diagnosis of stoke.

Exclusion criteria: 1) Patients below 18. 2) Stroke due to trauma. 3) Patients medical records which were not showing CT/MRI confirmed diagnosis. 4) Past history of Stroke

The data obtained were analyzed using SPSS version 21.0 software. Results were expressed in frequencies and percentages.

IV. Results And Analysis

During the 1-year study period, 437 patients with first-ever stroke were registered. In this study youngest patient was 29 years & oldest was 97 years old. One hundred (22.9%) were aged >75 years, and 337 (77.1%) were aged <75 years. (Table-1) Mean ages and sex ratios (women/men) were 79.7±5.2 and 61.4±11.4 years and 1.63 and 0.71 for the older and younger groups, respectively. (Table-2) The traditional risk factors in the 2 age groups are summarized in Table 3. In our study most common risk factors in group-1 was hypertension (HT) , second most common risk factor were atrial fibrillation and diabetes mellitus with equal (17%), other risk factors in order of frequency were peripheral arterial disease (16%), Heart diseases (15%), dyslipidaemia and transient ischemic attacks (TIA) with similar percentage (14%), and smoking (3%). In group-2 most common risk factor was hypertension (36.4%) followed by diabetes (30.8%), smoking (15.5%), dyslipidaemia (11.8%), Heart diseases (8%), and an equal percentage (6.8%) of peripheral arterial disease and atrial fibrillation.We found a high prevalence of arterial hypertension in both groups. Older patients more frequently had peripheral artery disease and TIA and less frequently had diabetes mellitus and smoking habits.

In our study (Table 4 and Table 5) most common type of stroke in both age groups was ischemic stroke, in group-1 it was (79%) and in group-2 it was (84.3%). Second most common type of stroke in both age groups was hemorrhagic stroke, in group-1 it was (20%) and in group-2 it was (11.6%).In group-2 there were 14(4.1%) cases of stroke due to subarachnoid haemorrhage, in group-1 it was only one patient. We found a higher frequency of coexisting asymptomatic lesions on CT/MRI scan in the oldest patients (44% versus 22.6%).(Table 6) Types and proportions of coexisting asymptomatic lesions were similar in the 2 groups (lacunar infarcts, 57.8% versus 61.4%; leukoaraiosis, 50% versus 54.5%; lacunar infarcts plus leukoaraiosis, 13.2% versus 13.6%; silent infarcts, 6.5% versus 6.8%, for patients aged<75 and >75 years, respectively).

Outcome features were markedly different between the 2 age groups and are detailed in Tables 7.

V. Discussion

In our study the proportion of very old subjects among all patients with first-ever stroke reached 22.9% and will certainly rise in the future with increasing life expectancy. The incidence rate of stroke increased constantly with increasing age, even at ≥85 years. [10] As in many studies, we report a higher incidence in men than in women in all age groups except the elderly. Arterial hypertension had a high prevalence, similar to other studies,[11] and was equally common in both age groups. Diabetes mellitus and smoking were more frequent in younger patients than in older ones; this finding strongly suggests the recent westernization of lifestyle in India. Emergence of these 2 vascular risk factors in young patients could contribute in the future to increase stroke incidence in the old population. Heart disease and atrial fibrillation showed a trend toward being higher in old patients. Preceding TIAs in patients with cerebral infarcts were more frequent in the elderly but were rare in comparison to those in other studies.19 The reason may be related to the higher rate of intracranial artery disease in our population, which seems to be associated with fewer TIAs than extracranial occlusive disease.[12]

The 2 age groups did not differ significantly in regard to distribution of ischemic stroke subtypes except in posterior circulation ischemic strokes which was more frequent in Group II. Haemorrhagic stroke was more frequent in Group II (20% vs 11.6%). This finding was in contrast to the study of Arboix et al,[13] where rates of ICH were very close in the 2 age groups. Previous studies have found a higher prevalence of TACI subtype in elderly than in younger patients, which has been assigned to a higher rate of atrial fibrillation.[14] We found one SAH in the elderly group. These results are consistent with those of the studies of Bamford et al12 and Ellekjaer et al,14 in which only 1 SAH was noted in 89 and 91 stroke patients aged≥85 years,respectively. The very low rate of SAH in the elderly raises the question of the difficulty of collecting data on such patients, who often die rapidly at home. Lacunar infarcts accounted for 19% of all stroke in the older group, which is slightly higher than in the hospital-based study of Arboix et al (15%).[15] Thus, age does not seem to influence ischemic stroke subtype.

Acute stroke in the very old patients was more severe than in patients younger than 75 years of age, with greater rates of in-hospital mortality (22% vs. 12.6%,), longer duration of hospital stay (14.8±9.2 vs. 9.2±7.2 days), and lesser frequency of absence of neurologic deficit at the time of hospital discharge (15.5% vs. 26.2%). These rates are similar to those reported in the hospital-based study of Arboix et a[16] and in the population-based study of Vemmos et al[17]. Several factors may lead to poorer outcome in the elderly. Complications such as cardiac and respiratory events occurred more frequently after stroke in the elderly. This is consistent with the likely poorer health and functional status before stroke in the older group. No data were obtained in our study on prestroke functional status; this constitutes a bias for poststroke disability analysis. However,we believe that a poorer functional status before stroke in very old patients is not sufficient to explain the strong difference found between the 2 groups in regard to poststroke disability. Moreover, only first-ever-in-a-lifetime strokes have been included, and thus a high proportion of patients who were independent before stroke have been selected. Finally, in addition to poorer health and prestrokedisability,the less intensive management of stroke in the elderly, may contribute to the poorer outcome in this age group. This constitutes a paradox because studies have shown that older stroke patients, who generally have a poor clinical prognosis, benefit more from active medical care than younger patients.[18] Stroke management appears to be one of the most important modifiable prognostic factors in older patients, and we believe that a special effort must be made to improve medical care in this older age group.

VI. Conclusion

Very old patients with acute stroke showed a differential clinical profile, different frequency of stroke subtypes, and a poorer outcome compared with stroke patients who were younger than 75 years of age. In our study, the proportion of stroke patients who are very old is close to 23%, and we assume that this rate will rise in the future with increasing life expectancy and westernization of habits. In our study significant differences were found between very old patients and those aged <75 years in term of risk factors and outcome Clinical and neuroimaging factors that are indicative of the severity of stroke and that were available at the time of the initial diagnosis and at the time of the development of cardiac and respiratory complications showed a predominant influence on in-hospital mortality and may help clinicians to establish prognosis more accurately.

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Conflict of interest:
All authors contributed equally to the development and revision of this manuscript.

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Tables

Table 1: Frequency & Percentage Of Cases According To Age Groups.

Age groups	Frequency	Percentage
Group I	100	22.8%
Group II	337	77.2%
Total	437	100%

Table 2: Sex wise distribution of stoke cases as per age groups.

Age groups	**Male**		**Female**		**Ratio**
	Frequency	**Percentage**	**Frequency**	**Percentage**	
Group I	38	38%	62	62%	1.63
Group II	196	58.2%	141	41.8%	0.71

Table 3: Frequencies of Traditional Vascular Risk Factors of First-Ever Stroke Patients in the 2 Age Groups

Risk factors	**GroupI**		**Group II**	
	Number	**Percentage**	**Number**	**Percentage**
Smoking	3	3%	52	15.5%

Arterial hypertension	51	51%	159	36.4%
Diabetes mellitus	17	17%	104	30.8%
Dyslipidaemia	14	14%	40	11.8%
Heart disease	15	15%	27	8%
Atrial fibrillation	17	17%	23	6.8%
Transient ischemic attack	14	14%	21	6.2%
Peripheral arterial disease	16	16%	23	6.8%

Table 4: Proportion of Stroke Type in the 2 Age Groups

Stroke types	**GroupI**		**Group II**	
	Number	**Percentage**	**Number**	**Percentage**
Ischemic stroke	79	79%	284	84.3%
Intra cerebral hemorrhage	20	20%	39	11.6%
Subarachnoid hemorrhage	1	1%	14	4.1%

Table 5: Proportion of Ischemic Stroke Subtypes in the 2 Age Groups

Ischemic Stroke Subtypes	**Group I (n=79)**		**Group II (n=284)**	
	Number	**Percentage**	**Number**	**Percentage**
TACI	12	15.2%	35	12.3%
PACI	42	53.2%	124	43.7%
LACI	15	19%	53	18.7%
POCI	10	12.6%	72	25.3%

Table 6: Types of coexisting asymptomatic lesions in the 2 Age Groups

	Group I (n=44)	**Group II (n=76)**
Lacunar infarcts	27	44
Leukoaraiosis	24	38
Lacunar infarcts plus Leukoaraiosis	6	10
Silent infarcts	3	5

Table 7: Outcome Features in the 2 Age Groups

	Group I (n=100)	**Group II (n=337)**
Barthel Index between 5th and 9th day (mean)	45.2	69.5
In hospital mortality (%)	22%	12.6%
Absence of neurological deficit at discharge (%)	15.5%	26.2%
Duration of hospital stay (mean days)	14.8	9.2

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