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Original Article

Others Section

Prevalence of Atrial Fibrillation in Patients with Acute Ischaemic Stroke: A Multicentric Cohort Study

INDU BHANA[1], ARCHANA OJHA[2], RAJENDRA KUMAR PANDEY[3], DURGVIJAY SINGH[4], MAHENDRA CHOURASIYA[5]

ABSTRACT

Introduction: India reports high prevalence of stroke, both in rural and urban areas. Secondary prevention is very important in patients with stroke to reduce the morbidity and mortality associated with it. Atrial Fibrillation (AF) is an important risk factor for stroke which can lead to cerebrovascular insult.

Aim: To study the prevalence of AF in patients with acute ischaemic stroke and to obtain the association between the parameters such as age, gender, stroke territory and stroke severity by National Institute of Health Stroke Scale (NIHSS).

Materials and Methods: In this multicentric cohort study, 150 patients with acute ischaemic stroke (new onset or recurrent) were studied at tertiary care centres located in Indore (Madhya Pradesh), Prayagraj, Moradabad and Lucknow (Uttar Pradesh) from January 2020 to January 2021. Age, gender, stroke territory and stroke severity by NIHSS was recorded and compared between those with and without AF. The Chi-square test was used to assess the association and obtaining significance.

Results: Prevalence of AF in patients with stroke was 8% (n=12), which was significantly high in female population (8 out of 12; p=0.025), those with age more than 60 years (10 out of 12; p=0.011), with atrial dilatation (9 out of 12; p=0.124), patients with severe stroke as per NIHSS (7 out of 12; p=0.001) and those with poor outcome (8 out of 12; p=0.012).

Conclusion: In the present study, 8% of the stroke patients had AF with stroke. Elderly age, female sex, and large atrial size on Echocardiogram (ECHO) should be intensively investigated for AF in stroke patients.

Keywords: Atrial dilatation, Holter monitoring, National institute of health stroke scale, Recurrent stroke

INTRODUCTION

Stroke is one of the serious global health problems leading to significant morbidity and mortality. Approximately, 80% of the death related to stroke is reported from the countries with low to moderate income [1,2]. Institutional care is continued in 20% of the stroke patients even after three months of the event [3]. India reports high prevalence of stroke, both in rural (84-262/100,000) and urban (334-424/100,000) area [4].

Atrial fibrillation is the most common arrhythmia encountered in clinical practice and accounts for 1/3rd of hospital admissions for cardiac rhythm disturbances [5]. Prevalence of AF in stroke patients varied considerably in previous studies [6]. Lip GYH et al., observed a prevalence of 0.1-4% in community-based research and 2.8-14% in hospital-based studies in a systematic analysis that included papers from Australia, Kuwait, India, Malaysia, New Zealand, Qatar, Singapore, South Korea, Thailand, Brazil, and Taiwan [7].

Secondary prevention is important to halt the progression and morbidity and mortality associated with recurrent episodes of stroke. This can be achieved by finding out and treating specific risk factors associated with the recurrence of the event. The AF is an important risk factor associated with recurrent episodes of stroke [8].

Only few studies from India have evaluated AF as a risk factor [2]. Sylaja PN et al., reported that 4% of patients had non valvular AF, and 5.6% had Rheumatic Heart Disease (RHD) (AF not mentioned) [8]. Another population-based study from Ludhiana in 2017 looked specifically at the profile of stroke patients with AF [9]. They also stated that the prevalence of AF in stroke patients is only documented in a few studies in India, with the highest percentage coming from Trivandrum, Kerala. A study from Ludhiana including 1,942 stroke patients found AF in 203 (10%) patients (3% had RHD and the rest had non valvular AF) [9].

Understanding the prevalence will help reveal the magnitude of the problem in present situation. There is a need to evaluate the role of AF in patients with stroke. Hence, present study aimed to evaluate the prevalence of AF in patients with stroke and tried to observe the association with the clinical demographic parameters.

MATERIALS AND METHODS

The present multicentric cohort study was performed at tertiary care centres from Indore (Madhya Pradesh), Prayagraj, Moradabad and Lucknow (Uttar Pradesh) from January 2020 to January 2021. A total of 150 patients with acute ischaemic stroke (new onset or recurrent) were studied.

Inclusion criteria: All prospective patients with acute ischaemic stroke (new onset or recurrent) coming to outpatients department of each centre were included.

Exclusion criteria: Patients with haemorrhagic stroke, stroke mimics, functional stroke, valvular heart disease and paroxysmal AF were excluded.

Study Procedure

During admission, Electrocardiography (ECG) and/or 24-hour ECG monitoring revealed both paroxysmal and chronic AF. Patients with an ECG-confirmed history of paroxysmal AF were likewise classified as having AF.

A detailed clinical history and examination of these patients was performed. Parameters including age, gender, stroke territory and stroke severity by NIHSS [10] was recorded and compared between those with and without AF.

A 2D-echocardiographic detection of abnormalities, ECG/24 hour Holter monitoring (in selected cases), cerebral angiography of brain and neck vessels and outcome of patients over 90 days follow-up based on Modified Rankin Scale (MRS) [11] was also performed.

Other parameters such as Ejection Fraction (EF) on ECHO, heart value status, atrial valve dilatation and outcome of patients were also recorded after three months.

STATISTICAL ANALYSIS

All the data analysis was performed using International Business Machines Corporation (IBM) Statistical Package for the Social Sciences (SPSS) version 20 software. Cross tabulation and frequency distribution were performed to prepare the tables. Age was expressed as mean and standard deviation whereas all the categorical data was expressed as numbers. The Chi-square test was used to find out the association between the parameters and AF. The p-value <0.05 was considered as significant.

RESULTS

A total 150 patients with acute ischaemic stroke were evaluated for the prevalence of AF. Mean age of study cohort was 56.71±11.28 years. A total of 23 (15.33%) patients were of age below 45 years. A total of 99 (66%) had anterior circulation stroke, 55 (36.7%) had severe stroke as per NIHSS [Table/Fig-1]. Out of 150 patients with acute ischaemic stroke, 12 (8%) patients had AF, indicating a prevalence of 8%. The prevalence of AF as per different clinical parameters and outcomes has been summarised in [Table/Fig-2].

Parameters		Non AF (n=138)	AF (n=12)	Total (N=150)	p-value
Gender	Female	91 (65.9)	8 (66.7)	99 (66)	**0.025**
	Male	47 (34.1)	4 (33.3)	51 (34)	
Age (years)	<60	68 (49.3)	2 (16.7)	70 (46.7)	**0.011**
	≥60	70 (50.7)	10 (83.3)	80 (53.3)	
Territory	Anterior	92 (66.7)	7 (58.3)	99 (66)	0.278
	Posterior	30 (21.7)	3 (25)	33 (22)	
	Multiple	16 (11.6)	2 (16.7)	18 (12)	
NIHSS	<5	13 (9.4)	2 (16.7)	15 (10)	**0.001**
	6-15	77 (55.8)	3 (25)	80 (53.3)	
	>15	48 (34.8)	7 (58.3)	55 (36.7)	

[Table/Fig-1]: Showing prevalence of Atrial Fibrillation (AF) as per different parameters.
Data is expressed as no of patients (%); AF: Atrial fibrillation; NIHSS: National institute of health stroke scale; p-value was calculated using Chi-square test

Parameters		Non AF (n=138)	AF (n=12)	Total (N=150)	p-value
EF on ECHO	Normal	118 (85.5)	3 (25)	121 (80.7)	0.489
	Medium	11 (8)	5 (41.7)	16 (10.7)	
	Low	9 (6.5)	4 (33.3)	13 (8.7)	
Heart valve status	Normal	123 (89.1)	10 (83.3)	133 (88.7)	0.068
	Abnormal	15 (10.9)	2 (16.7)	17 (11.3)	
Atrial dilatation	No dilatation	116 (84)	3 (25)	119 (79.3)	**0.124**
	Dilated	22 (16)	9 (75)	31 (20.7)	
Outcome	Partial recovery	108 (78.3)	8 (66.7)	116 (77.3)	**0.012**
	Full recovery	30 (21.7)	4 (33.3)	34 (22.7)	

[Table/Fig-2]: Showing prevalence of Atrial Fibrillation (AF) as per different clinical parameters and outcome.
Data is expressed as no of patients (%); AF: Atrial fibrillation; EF: Ejection fraction, ECHO: Echocardiogram; p-value was calculated using Chi-square test

DISCUSSION

In Indian population, the case fatality rate among patients with stroke is reported to be 41% [8]. Mortality due to index stroke and recurrent stroke is 70.45% and 19.27% respectively. Findings of Indo-US Collaborative Stroke Project revealed that 3/4th of the patients with stroke were of mild-to-moderate severity as per the NIHSS [8]. Several real world studies have suggested that thrombolysis, supportive medical therapy, effective rehabilitation, and effective secondary prevention can minimise death and disability [8,9].

Important findings of present study are that 8% patients with ischaemic stroke had AF. Cross tabulation between different clinical and demographic parameters among those with and without AF revealed that prevalence of AF was significantly high in female population. The AF was also more prevalent in those with age more than 60 years (10 out of 12 with mean age of 64.23±12.28). Atrial dilatation was found to have no significant association with AF in stroke patients. It was also revealed that patients with severe stroke as per NIHSS and those with poor outcome had more susceptibility to AF. In the study by Goel D et al., prevalence of AF (62 out of 246) was 25.2%, [2] which is higher than the present study. This might be explained by selection bias at tertiary hospital of ischaemic stroke with higher proportion of old age patients (83.3%).

However, Witsch J et al., from New York (n=2580) reported that AF prevalence was 3.4% after ischaemic stroke. Mean age of those with AF was 78.5±7.7years [12]. According to KP-RHYTHM Study, the burden of AF itself is an independent risk factor for ischaemic stroke in patients with paroxysmal AF in addition to other risk factors [13]. [Table/Fig-3] depicts different studies documenting the prevalence of AF in stroke patients [2,9,12,14-17].

Study	N	Location	Mean age of AF patients (years)	Gender (male vs female)	Prevalence
Goel D et al., 2020 [2]	246	Dehradun, Uttarakhand, India	61.4	69.5% vs. 30.5%	25.2%
Akanksha WG et al., 2017 [9]	1942	Ludhiana, India	62±14	59% vs. 41%	10%
Witsch J et al., 2018 [12]	2580	New York, USA	78.5±7.7	31.7% vs. 68.3%	3.4%
Adhikari KP et al., 2016 [14]	1012	Kathmandu, Nepal	55	54.6% vs. 45.4%	13.8%
Alam I et al., 2004 [15]	100	Pakistan	62.23±12.28	64% vs. 36%	12%
Basharat RA et al., 2002 [16]	100	Pakistan	58.47±4.82	NA	7%
Kannel WB et al., 1982 [17]	5191	Boston, USA	NA	50% vs 50%	1.89%
Present study	150	India	64.23±12.28	66.7% vs 33.3%	8%.

[Table/Fig-3]: Prevalence of AF in stroke patients reported by different studies [2,9,12,14-17].
NA: Not available

In present study, prevalence of AF was significantly higher in those with age more than 60 years. In a non systemic review by Hariri E et al., AF was found to be one of the significant risk factors for stroke in patients with old age [18]. Same study showed that prevalence of AF increases to 8% above 80 years of age. In Framingham cohort study, which monitored participants over a 22-year period, the incidence of AF was shown to increase with advancing age [17]. Age, hypertension, congestive heart failure, diabetes mellitus, coronary artery disease, and valve disease were identified as independent risk factors for the development of AF. This was followed by several studies proving the now well established link between age and AF [4,16].

Stroke with AF was significantly more common in females in present study. In line with present study a large nationwide Swedish health registers reported ischaemic stroke was more often AF related in women than in men [6]. Another study by Goel D et al., also reported higher prevalence of stroke with AF among females [2]. According to data from the West, the incidence and prevalence of AF are higher in men than in women, with male to female ratio of approximately 1.1% vs. 0.8% [18,19]. Men had a 1.5-fold higher risk of having AF than women in both the Framingham Heart Study and the Atherosclerosis Risk in Communities Study, and the lifetime risk of developing AF after age 40 in the Framingham cohort study was reported to be 26% for men and 23% for women [20,21]. However, studies in India have indicated a somewhat larger female preponderance, with male to female ratios ranging from 1:1.38 to 1:1.24 [22-26]. As

per the American Heart Association, a routine cardiac monitoring is required post acute cerebrovascular event to screen for serious cardiac arrhythmias [27].

Cardiac monitoring is well recommended by the guidelines. In present study, we performed 24-hour Holter monitoring which can sometime miss identification of AF. There are few studies reporting under estimation of AF prevalence in stroke patients using 24-hour Holter monitoring [2,18]. Using 24-hour Holter monitoring, prevalence of AF reported by Goel D et al., was 25.2% [2]. A review by Hariri E et al., recommended the use of 72-hour continuous recording mainly in patients with cryptogenic stroke [18]. In the present study, no significant difference was obtained in territory of stroke among patients with and without AF. In line with present study Goel D et al., studied 246 patients with acute Ischaemic stroke in a hospital-based study and reported no significant difference in vascular territory between those with and without AF (p=0.10) [2]. Another similar study by Yushan B et al., involving 83 patients reported that multiple vascular territories infarcts were not found to be significantly associated with the detection of AF [28].

Another important finding of present study was that patients with large size of atrium (>40 mm) had higher risk of AF. Hence, for such patients prolong monitoring is required. In present study we did not find any relationship between atrial enlargement and cause or consequence of AF [Table/Fig-2]. In line with present study, Goel D et al., also reported no significant association between atrial enlargement and AF prevalence [2]. However, a previous longitudinal study reported that atrial enlargement can occur because of AF [29]. The difference may be due to cross-sectional nature of the study due to which significance association was not obtained.

Another similar study from northern India reported that prevalence of AF among stroke was 10%. These patients also had old age and poor outcome [9]. Same was revealed in present study where stroke patients with AF had significantly high NIHSS score and poor outcome. No significant difference was obtained in EF on ECHO among patients with and without AF. Similar findings were depicted in a previous study from Uttarakhand, where left ventricular EF was found to be similar among the stroke patients with and without AF (p>0.05) [2]. No significant difference was obtained in abnormality of heart valve among patients with and without AF. Study by Goel D et al., found 63 patients with AF out of a total of 246. This study did not report any significant difference in heart valve status versus AF on 24-hour Holter monitoring in the cross tabulation performed [2].

Limitation(s)

Present study is not devoid of limitations; small sample size, small geographic area and large population of old age patients are few of them. There is a need of a large randomised multicentre study which can provide strength to present study findings.

CONCLUSION(S)

Based on the findings it can be concluded that prevalence of AF in stroke patients is significant and should not be underestimated. AF was more prevalent among females of age more than 60 years. Severe NIHSS profile and poor outcome had significant association with AF. Cardiac monitoring for at least 24 hours should be conducted to assess AF, mainly in those with age more than 60 years and having undetermined cause of stroke. Patients having severe stroke and poor outcome should also be monitored for the presence of AF.

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PARTICULARS OF CONTRIBUTORS:
1. Consultant Neurologist, Department of Neurology, Indore, Madhya Pradesh, India.
2. Assistant Professor, Department of Medicine, Motilal Nehru Medical College, Prayagraj, Uttar Pradesh, India.
3. Consultant Neurologist, Department of Neurology, Teerthankar Mahaveer Medical College and Research Centre, Moradabad, Uttar Pradesh, India.
4. Consultant Neurologist, Department of Neurology, Avadh Hospital and Heart Centre, Lucknow, Uttar Pradesh, India.
5. Assistant Professor, Department of Cardiology, Mahatma Gandhi Memorial Medical College, Indore, Madhya Pradesh, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Mahendra Chourasiya,
33, Dharkothi, Near Robert Nursing Home, Indore-452001, Madhya Pradesh, India.
E-mail: drambrish.singh1986@gmail.com

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