

FREQUENCY OF ATRIAL FIBRILLATION IN PATIENTS OF HYPERTENSION: A MULTICENTER STUDY

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ABSTRACT

Objective: To determine the frequency of atrial fibrillation in patients of hypertension presenting in two tertiary Cardiac Care Institutes.

Study Design: Descriptive Cross-sectional study.

Place and Duration of Study: Department of Cardiology, Punjab Institute of Cardiology (PIC) Lahore, from Mar 2018 to Nov 2018 and at Department of Cardiology/Interventional Cardiology, Armed Forced Institute of Cardiology/National Institute of Heart Diseases Rawalpindi, from Oct 2020 to Mar 2021.

Methodology: A total of 400 patients presented at emergency with blood pressure (BP) >140/90mmHg were included in the study after informed consent. Later on ECG was taken on a standard 12 lead format. Presence of Atrial fibrillation was confirmed. All the data was recorded in a pre-structured proforma. Descriptive statistics for data would be computed using SPSS-21. Frequency and percentages would be calculated for categorical variables like gender, diabetes and atrial fibrillation. Mean \pm SD would be calculated for continuous variables like age and duration of hypertension. Data was stratified for (i) Age, (ii) Gender, (iii) Diabetes, (iv) Duration of hypertension and (v) Medication for hypertension to control effect modifiers. Post stratification chi square test was applied keeping p -value <0.05 as significant.

Results: The mean age of the patients presenting in Punjab Institute of Cardiology, Lahore was 49.04 ± 7.08 years while was 49.25 ± 7.03 years. There were 294 (73.5%) male, out of which 148 (74%) were from PIC, Lahore and 146 (73%) were from Armed Forced Institute of Cardiology/National Institute of Heart Diseases Rawalpindi. There were 106 (26.5%) females, out of which 52 (26%) were from Punjab Institute of Cardiology, Lahore and 54 (27%) were from Armed Forced Institute of Cardiology/National Institute of Heart Diseases Rawalpindi. The male to female ratio was 2.8:1. Atrial fibrillation was noted in 39 (9.75%) of cases while 361 (90.25%) did not have atrial fibrillation. There was insignificant difference for atrial fibrillation in age groups and in both genders and as well as duration of hypertension has insignificant effect on Atrial fibrillation ($p > 0.05$).

Conclusion: Hence, the frequency of atrial fibrillation is low in hypertensive patients. But the value is not ignorable.

Keywords: Atrial fibrillation, Diabetes mellitus, Hypertension.

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INTRODUCTION

Hypertension is a well-known risk factor for cardiovascular and kidney diseases; Moreover, even slightly raised blood pressure increases the risk of cardiovascular diseases and stroke. Because age is a significant risk factor for hypertension, the aging of the population in Western developed countries exacerbates the problem¹. The prevalence of hypertension varies significantly by regions². Age group, race/ethnicity, educational level, country of birth, family income, health insurance, diabetes, obesity, and disability status all contribute towards significant differences (relative difference >10%) in the prevalence of hypertension³⁻⁵. There are various risk factors and clinical disorders that play important role in the development of atrial fibrillation, but hypertension due to its high prevalence

remains the main risk factor for atrial fibrillation. Several patho-physiological processes and path ways are believed to be involved in the on set of atrial fibrillation, including structural derangements, neuro-hormonal activation, fibrosis of myocardium, atherosclerosis etc. Atrial fibrillation increases the risk of cerebro-vascular accidents and stroke on its own, but when it coexists with high blood pressure, there is an abrupt increase of cardiovascular complications⁶.

Further more, in hypertensive patients, activation of the renin-angiotensin in-aldosterone system causes left atrial fibrosis and conduction block in the left atrium, leading to the development of atrial fibrillation. The effective inhibition of the renin-angiotensin-aldosterone path way by angiotensin converting enzyme (ACE) inhibitors or angiotensin receptor blockers (ARB) may be effective in both primary and secondary prevention of atrial fibrillation in hypertensive individuals, according to the literature; however, there exists

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controversies to it. Furthermore, good blood pressure control, optimal antithrombotic treatment, and rate control strategy for atrial fibrillation are key elements in the management of atrial fibrillation⁷. According to the different research studies that had been conducted, there is no agreement on the actual frequency of patients who have atrial fibrillation with hypertension. Further more, there is no local research available uptil now that has examined the same in our local population. There have been studies that show the frequency of atrial fibrillation in people with hypertension differs by their regions⁶⁻⁸. If the frequency of atrial fibrillation was found high then it can be advised to check all the patients of hypertension for atrial fibrillation.

METHODOLOGY

This descriptive cross-sectional, multi-centric study was conducted at department of Cardiology, Punjab Institute of Cardiology, Lahore Pakistan, from March to November 2018 and department of Cardiology/Interventional Cardiology, AFIC/NIHD, Rawalpindi from October 2020 to March 2021. By using the non probability, consecutive sampling technique and by using the 95% confidence level, 3.5% margin of error taking expected frequency of atrial fibrillation as 14%, the sample size was estimated to be 400 cases. Four hundred patients of both genders between 20-60 years of age with hypertension (blood pressure $\geq 140/90$ mmHg) diagnosed at least 6 months ago. Patients with history of blood disorders, cardiac congenital abnormalities, already undergone cardiac procedure (CABG/EP studies) or who have been treated for any cardiac disease were excluded from the study.

All the patients were evaluated for the history of taking any anti-hypertensive medication at the time of presentation in the emergency department of hospital. Later on ECG was taken on a standard 12 lead format (electrocardiogram model ECG-1112 Carewell electronics, Shenzhen). Presence of atrial fibrillation was confirmed as there is no p wave present on 12 lead ECG and unequal R-R interval and QRS complex < 120 ms. All the data was recorded in a pre-structured proforma. Patients with atrial fibrillation were managed as per ACC /AHA guidelines and according to the Institute protocol. Descriptive statistics for data would be computed using SPSS-21.

RESULTS

The mean age of the patients presenting in PIC, Lahore was 49.04 ± 7.08 years while at AFIC/NIHD Rawalpindi was 49.25 ± 7.03 years. There were 294 (73.5%) male, out of which 148 (74%) were from PIC,

Lahore and 146 (73%) were from AFIC/NIHD Rawalpindi. There were 106 (26.5%) females, out of which 52 (26%) were from PIC, Lahore and 54 (27%) were from AFIC/NIHD Rawalpindi. The male to female ratio was 2.8:1. The mean duration of hypertension was 4.10 ± 1.59 years in patients of PIC, Lahore and the mean duration of hypertension was 4.36 ± 1.75 years in patients of AFIC/NIHD. There were 154 (38.5%) diabetics, out of which 70 (35%) were from PIC, Lahore and 84 (42%) were from AFIC/NIHD Rawalpindi (table-I).

Table-I: Baseline characteristics of patients.

Characteristics	PIC	AFIC/NIHD
N	200	200
Age (Years)	49.04 ± 7.08	49.25 ± 7.03
Gender		
Male	148 (74.0%)	146 (73%)
Female	52 (26.0%)	54 (27%)
Duration of hypertension (years)	4.10 ± 1.59	4.36 ± 1.75
Diabetes Mellitus		
Yes	70 (35.0%)	84 (42%)
No	130 (65.0%)	116 (58%)

Atrial fibrillation was noted in 39 (9.75%) of cases while 361 (90.25%) did not have atrial fibrillation are shown in figure.

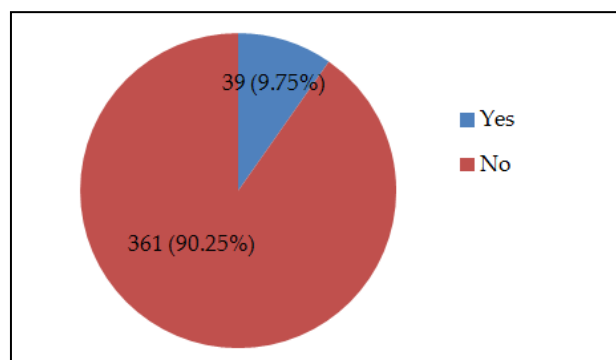


Figure: Frequency of atrial fibrillation.

Data was stratified for age and gender of patients and duration of hypertension. It was noticed that in patients of age 30-45 years, 9 (7.5%) patient had atrial fibrillation while among patients of age 46-60 years, 30 (10.7%) cases had atrial fibrillation. There was insignificant difference between both age groups for atrial fibrillation i.e. $p=0.321$. In male patients, 31 (10.5%) patient had atrial fibrillation while among female patients, 8 (7.5%) cases had atrial fibrillation. There was insignificant difference between both genders for atrial fibrillation i.e. $p=0.373$. In < 5 years of hypertension, 22 (9.6%) patient had atrial fibrillation while among ≥ 5

years hypertension, 17 (9.9%) cases had atrial fibrillation. There was insignificant difference between both groups for atrial fibrillation i.e. $p=0.938$. Among diabetics, atrial fibrillation was observed in 11 (7.1%) cases while in non-diabetics, it was detected in 28 (11.4%) patients and difference was insignificant i.e. $p=0.164$. In PIC, atrial fibrillation was observed in 22 (11%) patients while in AFIC, atrial fibrillation was observed in 17 (8.5%) patients and difference was insignificant i.e. $p=0.399$ table-II.

focus was on rate and rhythm control, as well as on anticoagulant medication, to prevent cardiovascular complications¹⁰. As the worldwide demographic tide results in a increasing population of elderly people, atrial fibrillation, the "ancient" arrhythmia originally discovered in 1909, has acquired the growing relevance in the twenty-first century. In fact, Braunwald mentioned the rising "epidemic" of atrial fibrillation in his Shattuck speech. Atrial fibrillation has a significant influence on morbidity and mortality, as well as socio-

Table-II: Comparison of atrial fibrillation in different groups.

n=400	Atrial Fibrillation		p-value	
	Yes	No		
Age (years)	30-45	9 (7.5%)	111 (92.5%)	0.321
	46-60	30 (10.7%)	250 (89.3%)	
Gender	Male	31 (10.5%)	263 (89.5%)	0.373
	Female	8 (7.5%)	89 (92.5%)	
Duration of Hypertension	< 5 years	22 (9.6%)	206 (90.4%)	0.938
	≥ 5 years	17 (9.9%)	155 (90.1%)	
Diabetes	Yes	11(7.1%)	143 (92.9%)	0.164
	No	28 (11.4%)	218 (88.6%)	
Institute	PIC	22 (11%)	178 (89%)	0.399
	AFIC/ NIHD	17 (8.5%)	183 (91.5%)	

DISCUSSION

Atrial fibrillation is the most common cardiac arrhythmia, and it's linked to many heart diseases. Patients with hypertension have a 42% increase in risk of developing atrial fibrillation, and thus these patients have a higher risk of cardiovascular morbidity and mortality. Left ventricular hypertrophy, poor ventricular filling, slowed atrial conduction velocity, structural abnormalities, and enlarged left atria are all linked to hypertension⁸. All of these changes in heart structure and function directly leads to atrial fibrillation and thus enhance the risk of thrombo-embolic complications. We will examine the possible pathways and mechanisms that leads to the increased risk of atrial fibrillation in hypertensive individuals, as well as the effects of various anti-hypertensive treatment regimens, with a particular focus on inhibition of the renin-angiotensin-system⁹.

Atrial fibrillation is considered a disease of aging population, since its prevalence doubles every decade after 50 years and reaches 10% in individuals <80 years of age. The frequency of atrial fibrillation is projected to increase in the future as the general population ages, therefore methods to prevent atrial fibrillation might be of clinical, prognostic, and economic importance.

On the other hand, prevention is a new strategy in the management of atrial fibrillation, as previously, the

economic implications related to hospital admissions, management of chronic disease and disabilities , and rehabilitation of individuals^{11,12}.

Nonetheless, these adverse trends are superimposed on a background of potentially evolving new treatment strategies. As a result, knowing the epidemiology and natural history of atrial fibrillation is essential for future resource allocation and the use of evolving new treatment strategies, that are targeted to decrease the disease's impact on a changing patient population¹³. Atrial fibrillation is the most prevalent rhythm disorder among U.S. patients hospitalized with a primary diagnosis of an arrhythmia, affecting roughly 2.2 million people^{14,15}.

The average age of patients is 75 years; approximately 70% of patients are between the ages of 65 and 85 years, and 84% are older than 65 years¹⁴. According to statistics derived from studies of chronic atrial fibrillation in North America, the United Kingdom, and Iceland, the general population has a prevalence of 0.5-1%¹⁶. After 5-15 years of follow-up in two independent trials limited to individuals over the age of 60, the incidence of atrial fibrillation is from 5-9%¹⁷.

After adjusting for age and other risk factors, in the Framingham cohort study, atrial fibrillation had occurred in men at 1.5 times the rate in women. The reason for more susceptibility in men as compared to

women for atrial fibrillation is unknown. According to previous studies, the prevalence of atrial fibrillation is greater in western populations than in Asians^{18,19}. Similarly in another study conducted by Davies *et al* which reported the prevalence of 5.1% in male and 2.6% in female²⁰.

Because the atrial muscle and conducting cells of cardiac tissue degenerate with age, the prevalence of atrial fibrillation increases²⁰. Our findings differed from those of studies done on the Western and other Asian populations. The conclusion that males had a higher preponderance is also in line with prior researches²¹. On the prevalence of atrial fibrillation, we discovered a substantial interaction between age and gender. In the age group <60 years, males were more likely than females to develop atrial fibrillation, but there was no such association after the age of 70 years. This result was not seen in prior European and American publications. However, Taiwan has reported a similar interaction. Therefore, the effect of male gender on the increased prevalence of atrial fibrillation in Asian population may disappear after the age of 70 years²².

In our study, we observed that in PIC, Lahore atrial fibrillation was observed in 22 (11%) patients while in AFIC/NIHD, Rawalpindi, a trial fibrillation was observed in 17 (8.5%) patients and the difference was insignificant i.e. $p=0.399$. The results of our study have clinical implications. Our main objective was to get an accurate estimate of prevalence of atrial fibrillation in hypertensive population. Our prevalence estimate 9.75% atrial fibrillation in the hypertensive population is high considering the malignant course of this disease that might cause a serious thrombo-embolic stroke.

CONCLUSION

Hence, the frequency of atrial fibrillation is low in hypertensive patients consulting the Cardiology department of PIC, Lahore and Cardiology/ Interventional Cardiology department of AFIC/NIHD, Rawalpindi. But the value is not ignorable in both cardiac Institutes. Thus we can recommend for periodically screening of hypertensive patients for atrial fibrillation. So that prevention and early intervention can be made to prevent the hypertensive patients from developing the life threatening cardiovascular complications.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

REFERENCES

1. Lacruz ME, Kluttig A, Hartwig S, L er M, Tiller D, Greiser KH, et al. Prevalence and incidence of hypertension in the general adult population: results of the carla-cohort study. *Med* 2015; 94(22): e952.
2. Schipf S, Werner A, Tamayo T, Holle R, Schunk M, Maier W, et al. Regional differences in the prevalence of known type 2 diabetes mellitus in 45–74 years old individuals: results from six population-based studies in Germany (DIAB-CORE Consortium). *Diabetic Med* 2012; 29(7): e88–e95.
3. Gillespie CD, Hurvitz KA, Control CFD, Prevention. Prevalence of hypertension and controlled hypertension-United States, 2007–2010. *MMWR Surveill Summ* 2013; 62(3): 144–48.
4. Aziz KU. Evolution of systemic hypertension in pakistani population. *J College Physicians Surgeons Pak* 2015; 25(4): 286–91.
5. Rottlaender D, Motloch LJ, Schmidt D, Reda S, Larbig R, Wolny M, et al. Clinical impact of atrial fibrillation in patients with pulmonary hypertension. *PLoS One* 2012; 7(3): e33902.
6. Manolis AJ, Rosei EA, Coca A, Cifkova R, Erdine SE, Kjeldsen S, et al. Hypertension and atrial fibrillation: diagnostic approach, prevention and treatment. Position paper of the working group 'hypertension arrhythmias and thrombosis' of the European Society of Hypertension. *J Hypert* 2012; 30(2): 239–52.
7. Lau Y, Yiu K, Siu C, Tse H. Hypertension and atrial fibrillation: epidemiology, pathophysiology and therapeutic implications. *J Human Hyperten* 2012; 26(10): 563–69.
8. Kannel WB, Wolf PA, Benjamin EJ, Levy D. Prevalence, incidence, prognosis, and predisposing conditions for atrial fibrillation: population-based estimates 1. *Am J Cardiol* 1998; 82(7): 2N–9N.
9. Aksnes TA, Kjeldsen SE, Julius S. Atrial fibrillation and hypertension. *Archives Med Sci* 2009; 5(2): 267–272.
10. Investigators AFF-ulo RM. A comparison of rate control and rhythm control in patients with atrial fibrillation. *New Engl J Med* 2002; 347(23): 1825–33.
11. Silverman ME. From rebellious palpitations to the discovery of auricular fibrillation: contributions of Mackenzie, Lewis and Einthoven. *Am J Cardiol* 1994; 73(5): 384–9.
12. Braunwald E. Cardiovascular medicine at the turn of the millennium: triumphs, concerns, and opportunities. *New Engl J Med* 1997; 337(19): 1360–1369.
13. Gersh B. The epidemiology of atrial fibrillation and atrial flutter. *Atrial Arrhythmias: State of the Art Armonk, New York: Futura Publishing* 1995; 36(7): 1–22.
14. Freinberg W, Blackshear J, Laupacis A, Kronmal R, Hart R. Prevalence, age distribution, and gender of patients with atrial fibrillation. *Arch Intern Med* 1995; 155(5): 469–473.
15. Investigators SPiAFSG. Preliminary report of the stroke prevention in atrial fibrillation study. *New Engl J Med* 1990; 322(12): 863–868.
16. Wolf PA, Dawber TR, Thomas HE, Kannel WB. Epidemiologic assessment of chronic atrial fibrillation and risk of stroke The framingham Study. *Neurol* 1978; 28(10): 973–977.
17. McLaughlin SA, Wright MJ, Morris KT, Giron GL, Sampson MR, Brockway JP, et al. Prevalence of lymphedema in women with breast cancer 5 years after sentinel lymph node biopsy or axillary dissection: objective measurements. *J Clinical Oncol* 2008; 26(32): 5213–5219.
18. Chiang CE, Zhang S, Tse HF, Teo WS, Omar R, Sriratanasathavorn C. Atrial fibrillation management in Asia: from the Asian expert forum on atrial fibrillation. *Inter J Cardiol* 2013; 164(1): 21–32.

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19. Tse HF, Wang YJ, Ai-Abdullah MA, Pizarro-Borromeo AB, Chiang CE, Krittayaphong R, et al. Stroke prevention in atrial fibrillation-an Asian stroke perspective. *Heart Rhythm* 2013; 10(7): 1082-1088.
20. Burstein B, Nattel S. Atrial fibrosis: mechanisms and clinical relevance in atrial fibrillation. *J Am Coll Cardiol* 2008; 51(8): 802-09.
21. Heeringa J, van der Kuip DA, Hofman A, Kors JA, van Herpen G, Stricker BHC, et al. Prevalence, incidence and lifetime risk of atrial fibrillation: the rotterdam study. *Eur Heart J* 2006; 27(8): 949-953.
22. Alonso A, Lopez FL, Matsushita K, Loefer LR, Agarwal SK, Chen LY, et al. Chronic kidney disease is associated with the incidence of atrial fibrillationclinical perspective: the atherosclerosis risk in communities (ARIC) study. *Circul* 2011; 123(25): 2946-2953.