

STUDY OF CLINICAL, ETIOLOGICAL AND ECHOCARDIOGRAPHIC PROFILE OF ATRIAL FIBRILLATION IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Objectives: The present study was aimed in analyzing the clinical presentations, etiological influences, and echocardiographic structures of cases of atrial fibrillation (AF) in SCB MCH, Cuttack.

Methods: A cross-sectional research performed on AF cases admitted in SCB MCH, Cuttack, during the period from May 2021 to November 2022. Detailed history, thorough clinical examination and transthoracic echocardiography, has been carried out among study population.

Results: Average age of cases was observed as 49.56±17.64 years. Among 100 cases, females were found to be 63% whereas males as 37%. Most of the cases were suffered due to more than one symptoms of severity. About 59% of cases showed rheumatic heart disease (RHD) out of total 100 cases. Among RHD cases, 43% cases were female and the male cases as 16%. Hypertension and coronary artery disease formed the furthestmost communal reasons. Mean left atrial (LA) dimension between the study populations was found to be 4.49±0.57 cm.

Conclusion: This study concluded that dyspnea seems to be the most common observed symptom; RHD forms the major communal reasons for AF, preceded by hypertension. Mitral valve seems to be involved among all cases of RHD. In major cases, LA enlargement has been reported; therefore, this forms the prognosticator of AF. LA enlargement cases seem to be further susceptible to progress to LA appendage clot.

Keywords: Atrial fibrillation, Clinical profile, Etiology, Echocardiographic profile.

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INTRODUCTION

Atrial fibrillation (AF) occurs to be an utmost recurrent cardiac arrhythmia in daily clinical management. Approximately estimated to a maximum of 6–12 million population seems to be affected with AF in United States by the year 2050 and 17.9 million population in Europe by the year 2060 [1]. Approximately, it is stated that AF contributes 1/3rd of arrhythmia associated admitted cases in healthcare centers. This seems to be a supraventricular arrhythmia considered by less amplitude baseline oscillations (Fibrillatory or F waves from the fibrillating area) and an irregularly irregular ventricular rhythm [2]. Documentation of these disorders appears to be significant since this is connected through substantial morbidity and mortality.

AF shows considerable significances in the study populace, counting compromised eminence of life, augmented hospitalization rates, stroke manifestation, and improved therapeutic budgeting's. Possibly, the significant magnitude of AF has improved the risk of stroke associated to the overall population, reporting approximately 25% of all strokes [3]. This too also connected with the progress of heart failure; and in turn related to unpredicted demise.

Occurrence upsurges with age, with >95% of AF cases were found to be in the age category >60 years. The frequency of the study population above the age of 80 years was found to be approximately 10%. The life-time threat of emerging AF for males around the age of 40 years was found to be approximately 25%. AF is somewhat further communal in males when compared to females and this is also very particular among whites than blacks [3].

AF frequently indicates the ultimate communal path for a multitude of further predisposing cardiac as well as non-cardiac circumstances. Threat factors for emerging AF, along with age criteria and essential cardiac disorders comprise hypertension, diabetes mellitus, obesity, and sleep apnea [3].

AF seems to be the furthestmost most common arrhythmia which necessitates clinical management because it is regularly observed in experimental therapy. Although, most of the cases with AF seems to be comparatively asymptomatic, all cases have intensely restrictive symptoms because of prompt or slow basal ventricular rates, a prompt cardio accelerator reaction to exercise, beat to beat in discretion with connected palpitations, also the loss of atrial systolic influence to ventricular filling leading to reduced cardiac output.

Enhanced recognition of scientific epidemiology of AF, beside with an improved appreciation of the mechanisms, is necessary for the progress of the developed procedures for AF inhibition. This current observation has been designed to investigate the clinical, etiological, and echocardiographic profile of AF in study populace.

METHODS

Analysis of the clinical, etiological, and echocardiographic profile of AF in study population of 100 cases was performed as a cross-sectional research during the period from May 2021 to November 2022 in the Department of General Medicine and Cardiology, SCB Medical College, Cuttack. The Institutional Ethical Committee approval has been obtained proceeding to the research initiation.

Inclusion criteria

All cases with age above 18 years those are identified with AF through electrocardiogram were included in this present study.

Exclusion criteria

Cases with age below 18 years and pregnant women have been excluded from the study. Informed consent was collected from all cases that were enrolled into this research.

ECG recordings

12 lead ECG was done in all patients with a calibration of 1 mV=10 mm, with the paper speed at 25 mm/s variables, namely, absence of P-wave; irregularly irregular RR interval; atrial activity reflected by an irregularly corrugated deflection “f” wave were estimated. For all the study population, among all cases enrolled into the study, a thorough examination including physical investigations was carried out.

Complete blood count, plasma sugar values both fasting and 2-h postprandial, HbA1C, thyroid function test, PT/INR, Chest X-ray PA View, Pulmonary Function Test in case of suspected COPD cases, Transthoracic, M – mode, and 2 Dimensional and Color Doppler Echocardiography were carried out among all cases with the subsequent features namely:

- Valvular/nonvalvular lesion
- Valves involved
- Ejection fraction
- Left atrium size
- Left atrial (LA)/ventricular clot
- LA auto contrast.

Furthermore, coronary angiography for suspected coronary artery disease (CAD) was performed among all the patients. Patients were categorized as per LA size enlargement based on American society of echocardiography. For cases who established stroke as a complication of AF, NCCT brain was taken and the features were observed and documented.

Statistical analysis

Interpretation of data was implemented using SPSS software version 21.0.

RESULTS

Among 100 cases, those who diagnosed with AF were comprised in the research. AF affected in various age categories varying from 18 to 82 years and only 3% was observed to be less than the age of 20 and more than the age of 80 years. Mean age among the patients was found to be 49.56±17.64 years (Table 1).

The gender distributions among the patients are depicted in Table 2. Female patients were more than the male category affected with AF.

Dyspnea (Fig. 1) seems to be a very commonly observed symptom among the study population with 84%. Subsequently followed by other symptoms, palpitation with 44% of the study population was observed. Among these 100 cases, seven patients were found to be asymptomatic.

In this present study, rheumatic heart disease (RHD) (Fig. 2) (59%) seems to be the supreme common etiological factor connected with AF. Subsequently followed by hypertension (15%), proceeded by CAD (12%). Some of the other less common causes included cardiomyopathies, COPD, thyroid disorders, and lone AF.

Echocardiographic parameters

In 59 patients with valvular lesions (Table 3), isolated mitral stenosis (MS) showed leading valvular lesion with 49%, followed by MS with mitral regurgitation (MR) having 37%. Aortic valve involvement has been observed among 11% of the patients. Only 3% reported to undergo mitral valve replacement.

Heart rate (HR) seems to be >140/min which is associated with 67% of the patients with clot, whereas 1.2% with a HR <140/min with clot on echo (Fig. 3). The presence of clot was significantly different between HR more than 140 and <140 (p=0.001).

In 13 cases with a clot on echo (Fig. 4), 69.2% cases showed established CVA (embolism) while among 87 patients who did not have a clot on echo, 11.5% cases established CVA (embolism). The development of

CVA (embolism) was significantly different between presence and absence of clot on echo (p=0.001).

In our study (Table 4), mean LA size in RHD cases were 4.855±0.44 cm. Mean LA size among non-RHD cases patients was 3.973±0.25 cm. Mean LA size was statistically significant among RHD and non-RHD cases (p=0.0001).

All male cases with LA enlargement (Fig. 5), 27.8% of them found to have LA clot on echo whereas patients not having LA enlargement did

Table 1: Proportion of cases between different age groups

Age (years)	Frequency
<20	3
21-40	29
41-60	40
61-80	25
>80	3
Total	100

Table 2: Sex wise distribution among the patients

Sex	Frequency
Male	37
Female	63
Total	100

Table 3: Valvular lesions distribution between RHD

RHD	Frequency (Percent)
MS	29 (49.0)
MS, MR	22 (37.0)
MS, AS, AR	5 (8.47)
MS, MR, AS, AR	1 (1.69)
S/P MVR	2 (3.38)
Total	59 (100)

RHD: Rheumatic heart disease

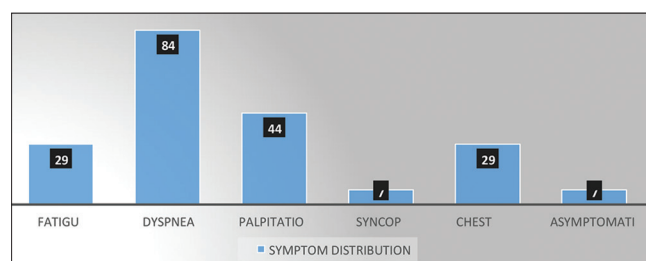


Fig. 1: Characteristics of symptoms

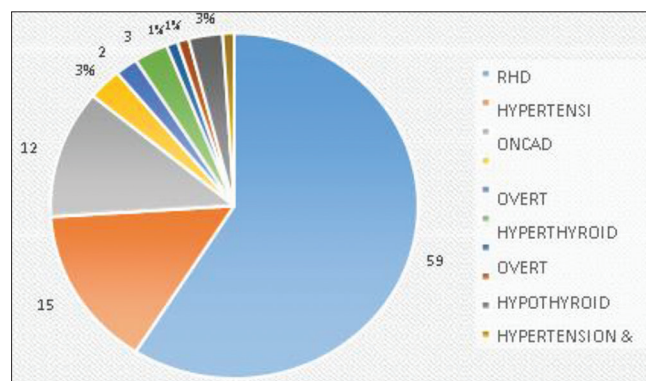


Fig. 2: Etiological factors of atrial fibrillation

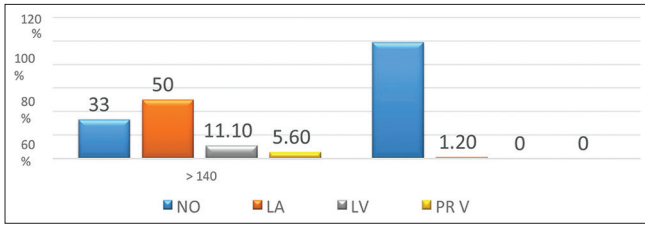


Fig. 3: Heart rate and clot on ECHO

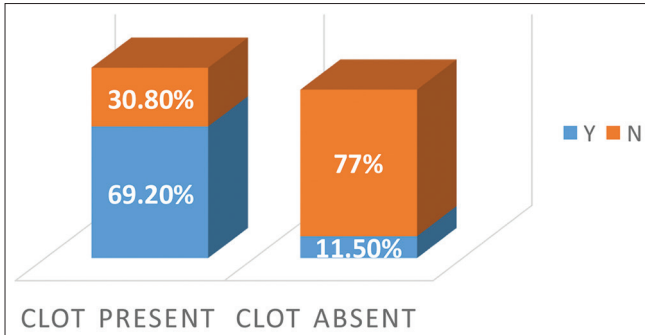


Fig. 4: LA enlargements and clot on ECHO

not show any clot on echo. LA enlargement showed significantly higher incidence of clot on echo ($p=0.013$). LA enlargement in relation to clot on echo in females was shown in Fig. 6.

Among patients with LA enlargement (Fig. 7), 23.3% had CVA (embolic) and among patients not having LA enlargement, 7.4% patients showed CVA (embolic). LA enlargement showed greater prevalence of CVA (embolic) ($p=0.072$; nearly significant).

DISCUSSION

Mean age of AF in this observation was found to be 49.56 ± 17.64 years. AFFIRM study [4] stated mean age in their results as 70 years. Females (63%) were affected more in numbers than males (37%) in this study. Rendering to AFFIRM observation, prevalence rate among male cases was found to be 61%. Framingham cardiac research [5] described a greater prevalence among male population. With this report of 100 cases, the etiology of RHD was found to be among 59 cases. Mean age in RHD patients was 49.02 ± 18.66 years. Morin et al. [6] documented that the etiology of 70% of population as RHD. AFFIRM research showed precise short prevalence of RHD in their documented research.

Most of the reports documented among tropical countries revealed a greater prevalence of AF in RHD than the Western population. The subsequent reasons for AF in this study were found to be hypertension with 15% of the study population.

As per Framingham research [5], half of the cases were accounted for hypertension. According to AFFIRM study [4], hypertension was observed among 71% of cases. The relationship of AF with hypertension was found to be decreased in this current report than the above trials. CAD was observed with 12% of the study population. AFFIRM [4] research documented that CAD with 38% of the cases. Lévy et al. [7]. reported 16.6% of CAD as the principal reason that is almost comparable with our obtained observations. Thyroid dysfunction was seen in five cases of which three had overt hyperthyroidism, and two reported overt hypothyroidism. Auer et al. [8] stated that AF observed in 13.8% with overt hyperthyroidism; 12.7% with sub-clinical hyperthyroidism. Barbisan et al. [9] study revealed that 72 cases with AF, 16.6% with thyroid dysfunction in that 5.6% with hypothyroidism.

Dyspnea is observed to be the utmost communal symptom reported among 84% along with 44% with palpitation. Tischler et al. [10]

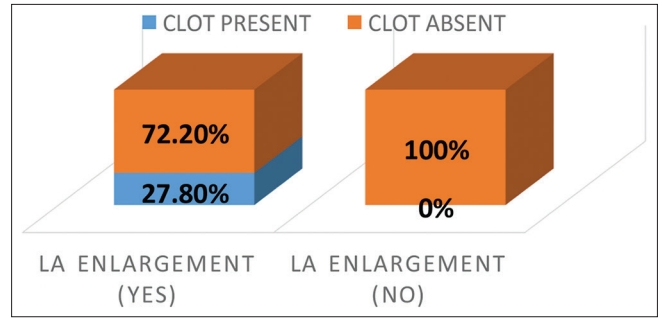


Fig. 5: Left atrial enlargement and clot on echo in males

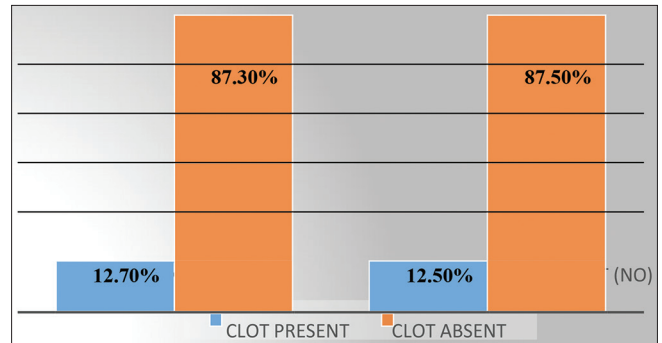


Fig. 6: LA enlargements and CVA

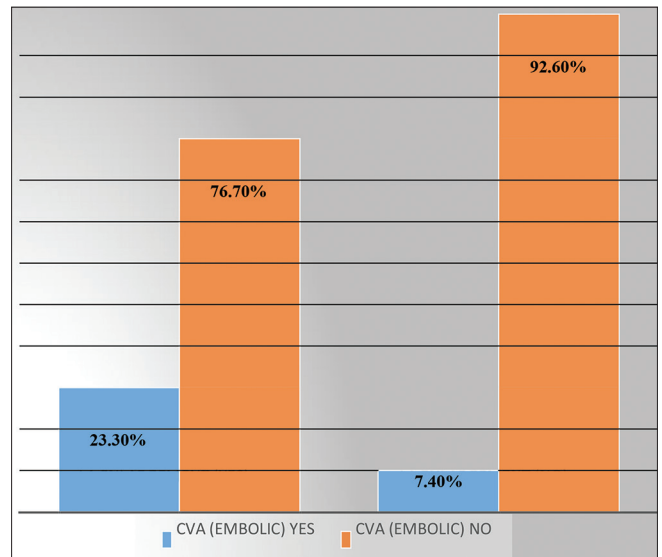


Fig. 7: Left atrial enlargement and CVA (embolic)

Table 4: Mean LA size in RHD versus non-RHD

Mean LA size	n	Mean±Standard deviation	p-value
LA size RHD	59	4.8551±0.44	0.0001
LA size Non-RHD	41	3.9732±0.25	

RHD: Rheumatic heart disease, LA: Left atrial

documented that Dyspnea among 62% of patients and palpitation among 33% of patients. Flaker et al. [11] stated that 78% with dyspnea; 11% with chest pain. Out of 59 patients of RHD, isolated MS seems to be the leading valvular lesion (49%), followed by MS with MR (37%). Aortic valve involvement is observed in 11% of patients. Sharma et al.

reported that pure MS among 48% of patients. Predominant MR was seen in 35% of patients.

AFFIRM researchers documented that MR was observed among 15% of study population. In 19 cases established with CVA (embolic), nine cases showed clot on echo (6 showed LA clot, two cases showed LV clot, and one case showed Prosthetic valve clot). Rest ten cases does not possessed clot on echo. In 13 cases showing a clot on echo, nine cases (69.2%) established CVA (embolic); however, out of 87 patients who did not have clot on echo, 11.5% developed CVA (embolic). The development of CVA (embolism) was significantly different in the presence and absence of clot on echo ($p=0.001$).

Reports by Wood [12] and Deverall *et al.* [13] observed that systemic embolization follows principally in the presence of AF. In this analysis, out of 18 patients having HR more than 140 beats/min, 67% had clot on echo while among 82 patients having HR <140 beats/min, 1.2% showed clot on echo. Occurrence of clot in echo was significantly different between HR of more than 140 and <140 ($p=0.001$). Mean LA size among our study participants was 4.49 ± 0.57 cm. The study by Singh *et al.* [14] showed it to be 4.51 ± 0.95 cm. Out of 37 male patients, 18 (48.6%) patients had LA enlargement (LA size ≥ 4.1 cm) and among them 39% had severe LA enlargement (LA size ≥ 5.2 cm).

Among 63 female patients, 55 (87.3%) patients had LA enlargement (LA dimensions ≥ 3.9 cm) and among them 51% had severe LA enlargement (LA dimension ≥ 4.7 cm). Mean LA size among RHD patients was 4.855 ± 0.44 cm. Mean LA size among non-RHD cases was 3.973 ± 0.25 cm. Mean LA size found to be significantly dissimilar among RHD and non-RHD patients ($p=0.0001$). About 43% of cases with severe LA enlargement in males cases showed MS, MR where as 57% showed MS alone, 46% of females with severe LA enlargement showed isolated MS whereas 43% showed MS, MR. About 7% showed MS, AS, AR, and 4% showed MS, MR, AS, and AR. Most of the male cases with LA enlargement, 27.8% of them found to have LA clot on echo whereas patients not having LA enlargement didn't show any clot on echo. LA enlargement showed significantly greater occurrence of clot on echo ($p=0.013$).

Ul Hassan *et al.* [15] reported in his study that the incidence of LA appendage clots on trans-esophageal echocardiography in cases with severe MS seems to be most communal and additional recurrent in cases with AF and LA dimension as ≥ 45 mm.

In male cases with LA expansion, 29% with rigorous LA expansion showed CVA and 33% with rational LA expansion among CVA. Whereas in the female cases with LA expansion, 29% with severe expansion among CVA and 2% with adequate expansion in CVA. LA expansion showed greater occurrence of CVA (embolic) ($p=0.072$; nearly significant). Xue *et al.* [16] described that among 313 cases; LA size seems to be an independent prognosticator of overall recurring ischemic strokes and the composite of frequent cardioembolic and/or cryptogenic stroke.

CONCLUSION

Average age of AF seems to be 49.56 ± 17.64 years. Female cases were found to be suffered a lot when compared to the male population. Dyspnea observed to be the maximum communal observed symptom, correspondingly palpitation as the next symptom. RHD reported as another furthestmost commonly observed etiological factor proceeded by hypertension and CAD. Mean age in RHD patients was 49.02 ± 18.66 years. Principal valve exaggerated seems to be the mitral valve together in isolation and combination. Higher cardiac rate >140/min found to be the risk factor for clot formation. Occurrence of clot on echo augmented the threat of CVA (embolism). Mean LA size significantly differed in RHD and non-RHD patients ($p=0.0001$). LA enlargement showed a greater prevalence of clot on echocardiography embolic stroke. Meticulous evaluation of risk factors and prompt treatment will reduce the complications, morbidity, and mortality.

Limitations of the study

The study population seems to be too less and the research was performed in a single tertiary care center. It is a cross-sectional research and the follow-up of the patients were not done. Furthermore, peripheral embolism and transesophageal echo were not done for this study.

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AUTHORSHIP CONTRIBUTIONS

Dr. Pramod Kumar Rout and Dr. Nirmal Kumar Mohanty – Design and Data collection, journal selection, literature analysis for the manuscript. Dr. Madhusmita Sahoo and Dr. Satishranjan Lenka - Analysis or interpretation, literature search, manuscript writing and submission to the journal.

CONFLICTS OF INTEREST

Nil.

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Nil.

REFERENCES

- Lippi G, Sanchis-Gomar F, Cervellin G. Global epidemiology of atrial fibrillation: An increasing epidemic and public health challenge. *Int J Stroke* 2021;16:217-21. doi: 10.1177/1747493019897870. Erratum in: *Int J Stroke* 2020;17:493020905964. PMID: 31955707
- Bonow RO, Mann DL, Zipes DP, Libby P. Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine. 12th ed. Netherlands: Elsevier Science; 2021.
- Jameson J, Fauci AS, Kasper DL, Hauser SL, Longo DL, Loscalzo J. Harrison's Principles of Internal Medicine. 21st ed. New York: McGraw Hill; 2022.
- Atrial fibrillation follow-up investigation of rhythm management -- the AFFIRM study design. The Planning and Steering Committees of the AFFIRM study for the NHLBI AFFIRM investigators. *Am J Cardiol* 1997;79:1198-202. PMID: 9164885
- Kannel WB. Some lessons in cardiovascular epidemiology from Framingham. *Am J Cardiol* 1976;37:269-82. doi: 10.1016/0002-9149(76)90323-4. PMID: 1246956
- Morin DP, Bernard ML, Madias C, Rogers PA, Thihalolipavan S, Estes NA 3rd. The state of the art: Atrial fibrillation epidemiology, prevention, and treatment. *Mayo Clin Proc* 2016;91:1778-810. doi: 10.1016/j.mayocp.2016.08.022. PMID: 27825618
- Lévy S, Maarek M, Coumel P, Guize L, Lekieffre J, Medvedowsky JL, *et al.* Characterization of different subsets of atrial fibrillation in general practice in France: The ALFA study. The College of French Cardiologists. *Circulation* 1999;99:3028-35. doi: 10.1161/01.cir.99.23.3028. PMID: 10368121
- Auer J, Scheibner P, Mische T, Langsteger W, Eber O, Eber B. Subclinical hyperthyroidism as a risk factor for atrial fibrillation. *Am Heart J* 2001;142:838-42. doi: 10.1067/mhj.2001.119370. PMID: 11685172
- Barbisan JN, Fuchs FD, Schaan BD. Prevalence of thyroid dysfunction in patients with acute atrial fibrillation attended at a cardiology emergency room. *Sao Paulo Med J* 2003;121:159-62. doi: 10.1590/s1516-31802003000400004. PMID: 14595508
- Tischler MD, Lee TH, McAndrew KA, Sax PE, Sutton MS, Lee RT. Clinical, echocardiographic and Doppler correlates of clinical instability with onset of atrial fibrillation. *Am J Cardiol* 1990;66:721-4. doi: 10.1016/0002-9149(90)91137-u. PMID: 2399889
- Flaker GC, Fletcher KA, Rothbart RM, Halperin JL, Hart RG. Clinical and echocardiographic features of intermittent atrial fibrillation that predict recurrent atrial fibrillation. *Stroke Prevention in Atrial Fibrillation (SPAF) Investigators. Am J Cardiol* 1995;76:355-8. doi: 10.1016/s0002-9149(99)80100-3. PMID: 7639159
- Wood P. An appreciation of mitral stenosis. I. Clinical features. *Br Med J* 1954;1:1051-63; contd. doi: 10.1136/bmj.1.4870.1051. PMID: 13149899; PMCID: PMC2093403
- Deverall PB, Olley PM, Smith DR, Watson DA, Whitaker W. Incidence of systemic embolism before and after mitral valvotomy.

- Thorax 1968;23:530-6. doi: 10.1136/thx.23.5.530. PMID: 5680237; PMCID: PMC471843
14. Singh R, Kashyap R, Bhardwaj R, Marwaha R, Thakur M, Singh TP, *et al.* The clinical and etiological profile of atrial fibrillation after echocardiography in a tertiary care centre from North India - a cross sectional observational study. *Int J Res Med Sci* 2017;5:847-50. doi: 10.18203/2320-6012.ijrms20170623
 15. Ul Hassan M, Hussain C, Gul AM, Jan HU, Hafizullah M. Frequency of left atrial and appendage clot in patients with severe mitral stenosis. *J Ayub Med Coll Abbottabad* 2010;22:40-2. PMID: 21702263
 16. Xue J, Lin Y, Huang W, Chen X, Li Q, Cai Z, *et al.* Left atrial size and risk of recurrent ischemic stroke in a Chinese population. *Brain Behav* 2017;7:e00702. doi: 10.1002/brb3.702. PMID: 28523236; PMCID: PMC5434199