Original article

Epidemiological and clinical characteristics of non-valvulair atrial fibrillation in Agadez, Niger

Caractéristiques épidémiologiques et cliniques de la fibrillation atriale non valvulaire à Agadez, Niger

A Abdouramane*[1], B Dodo[2], I Ousmane[3], O Abdoulaye[4], M Garba[1], A Anaba[1], I Toure[2]

Résumé

Objectifs : Décrire les caractéristiques épidémiologiques et cliniques de la fibrillation auriculaire (FA) non valvulaire à l'hôpital régional d'Agadez au Niger.

Méthodologie : Il s'agit d'une étude prospective descriptive menée sur une période de 4 mois allant d'octobre 2022 à janvier 2023 au sein du service de médecine-cardiologie de l'hôpital régional d'Agadez. Les patients ambulatoires et hospitalisés avec un diagnostic de fibrillation auriculaire non valvulaire (définie comme l'absence de sténose mitrale ou de prothèse valvulaire) par électrocardiogramme et échocardiographie ont été inclus.

Résultats : Au total, 802 patients ont été vus au cours de la période d'étude, dont 60 présentaient une fibrillation auriculaire non valvulaire, soit une prévalence hospitalière de 7,48 % avec un sex-ratio (H/F) de 0,87. L'âge moyen était de 66,58 ± 14,38 ans. Les facteurs de risque cardiovasculaire étaient dominés par l'hypertension (71,7 %). La dyspnée d'effort (61,7 %) était le principal motif de découverte. Le type le plus fréquent était la FA persistante prolongée (30 %). La stratégie thérapeutique choisie était le contrôle de la fréquence cardiaque chez 85 % des patients et les molécules utilisées étaient des bêtabloquants chez 75 %. Le traitement antithrombotique était dominé par un traitement antivitamine K au long cours chez 40 % des patients. Des anticoagulants oraux directs (DAC) ont été utilisés dans 26,7 % des cas. Les principales complications étaient l'insuffisance cardiaque (61,7 %), les complications cardioemboliques (20 %) et le collapsus rythmique (13,3 %). Le taux de mortalité était de 11,7%.

Conclusion : La fibrillation auriculaire non valvulaire est un trouble du rythme nosocomial fréquent, responsable d'une mortalité importante par complications hémodynamiques et thromboemboliques.

Mots-clés : Fibrillation auriculaire, Agadez, Niger.

Abstract

Objectives: Describe the epidemiological and clinical characteristics of non-valvular atrial fibrillation (AF) at the Agadez regional hospital center in Niger.

Methodology: This was a prospective descriptive study over a period of 4 months from October 2022 to January 2023 in the medicine-cardiology department

of the Agadez regional hospital. Included were patients seen in outpatient clinics and hospitalizations in whom the diagnosis of non-valvular atrial fibrillation (defined by the absence of mitral stenosis or prosthetic valves) had been made by an electrocardiogram and echocardiography.

Results: In total, 802 patients were seen during the study period, among whom 60 patients presented non-valvular atrial fibrillation, i.e. a hospital prevalence of 7.48% with a sex ratio (M/F) of 0.87. The average age was 66.58±14.38 years. Cardiovascular risk factors were dominated by hypertension with 71.7%. Dyspnea (61.7%) was the main circumstance. The most common type was prolonged persistent AF in 30% of patients. The therapeutic strategy chosen was heart rate control in 85% of patients and the molecules used were beta blockers in 75%. The prescribed antithrombotic treatment was dominated by long-term vitamin K antagonists in 40% of patients. Direct oral anticoagulants (DOACs) were used in 26.7%. The main complications were heart failure (61.7%), cardioembolic complications (20%) and rhythmic collapse (13.3%). The mortality rate was 11.7%.

Conclusion: Non-valvular atrial fibrillation is a frequent rhythm disorder in hospitals responsible for significant mortality linked to hemodynamic and thromboembolic complications.

Keywords: Atrial fibrillation, Agadez, Niger.

Introduction

Atrial fibrillation (AF) is a supraventricular arrhythmia characterized by anarchic atrial electrical activity, the main consequence of which is impaired mechanical function of the atria [1]. The diagnosis of AF must be confirmed by a conventional 12-lead ECG or an ECG strip showing AF for at least 30 seconds [2].

It exposes the patient to two essential consequences: thromboembolic events due to the stagnation of blood mass in the atria, a source of thrombus, and the risk of heart failure due to poor ventricular filling, which is responsible for hemodynamic complications [3].

Valvular fibrillation, defined by the presence of tight stenosis and valvular prosthesis [4], is contrasted with non-valvular fibrillation, due to age, but also to certain cardiopathies or extra- cardiac anomalies. The non-valvular form is becoming increasingly important as a result of the ever-increasing incidence of non-valvular heart disease in the tropics [5-6].

AF is a major public health problem, with prevalence rising sharply worldwide as the population ages [7]. It is the most common tachycardia, and its prevalence increases with age. It is rare in young people (0.1%), reaching 5% in people over 65 and 9% in those over 80 [7].

In sub-Saharan Africa, and Niger in particular, despite therapeutic advances, morbidity and mortality remain high. The clinical presentation of this cardiac rhythm disorder is more severe than in developed countries [8].

The aim of our study is to describe the epidemiological and clinical features of non-valvular atrial fibrillation in hospitals in Agadez, Niger.

Methodology

We conducted a prospective, descriptive study over a 4-month period from October 2022 to January 2023 in the cardiology and medicine department of the regional hospital in Agadez, a town located some 1000 km from the capital Niamey. All outpatients and inpatients with a diagnosis of non-valvular atrial fibrillation were included, based on an electrocardiogram interpreted by a cardiologist and an echocardiogram. We did not include in the study all other rhythm disorders or patients who did not have a complete workup.

The parameters studied included socio-epidemiological, clinical, paraclinical and therapeutic data. The data were entered and analyzed using SPSS 20.0 software. The aim was to study the variables and their distribution, as well as to compare means and proportions. Chi2 and Anova tests were used to compare qualitative and quantitative variables.

A value of p<0.05 was defined as statistically

significant.

The ESC 2020 definition had been used for the evolutionary classification of atrial fibrillation. The CHA2DS2-VASc score was used to assess our patients' embolic risk, and the HAS-BLED score to assess bleeding risk.

Definition of terms [2] :

AF diagnosed for the 1st time: previously undiagnosed AF, regardless of arrhythmia duration, presence and severity of AF-related symptoms;

-Paroxysmal AF: AF that terminates spontaneously or after an intervention within 7 days;

-Persistent AF : AF lasting more than 7 days, including episodes that are stopped by drug or electrical cardioversion, beyond 7 days;

-Prolonged persistent AF : AF that lasts at least one year and for which a rhythm control strategy is considered, often by ablation;

-Permanent AF if cardioversion is ineffective or not considered

Results

During the study period, 802 inpatients and cardiology outpatients were seen, 60 of whom had non-valvular atrial fibrillation, representing an in-hospital prevalence of 7.48%, with 28 men (46.7%) and 32 women (53.3%) with a sex ratio (M/F) of 0.87 . The mean age was 66.58 with a standard deviation of 14.38 and extremes of 20 and 91 . The 60-74 age group was the most represented at 40%, followed by the 75+ age group at 38.3% (Figure 1).

Cardiovascular risk factors were dominated by hypertension (71.7%), followed by a sedentary lifestyle (68.3%) and obesity/overweight (25%) (Figure 2) .

Clinically (Figure 3), exertional dyspnea (61.7%) and palpitations (28.3%) were the main circumstances of discovery. The mean heart rate was 112.25 beats/min ± 27.80, with extremes of 51 beats/min and 186 beats/min.

Prolonged persistent AF was found in 18 patients (30%), persistent AF in 13 patients (21.7%) and permanent AF in 12 patients (20%) (Table I).

Etiologies (Table II) were represented by hypertensive heart disease (61.7%), followed by dilated cardiomyopathy and ischemic heart disease with 11.7% and 8.3% respectively.

Therapeutic strategy The chosen therapeutic strategy was heart rate control (85%), except in cases of hemodynamic instability. Beta-blockers were used in 45 patients (75%), digoxin in 5 (8.3%) and their combination in 3. Rhythm control strategy was undertaken in 9 patients (15%). It involved pharmacological reduction with amiodarone in 6 patients and external electric shock in 3. These three patients (5%) had benefited from the strategy of rhythm control by external electric shock, which had enabled a return to sinus rhythm. In 13.3% of cases, these reductions were carried out in an emergency situation (rhythmic collapse).

Rhythm control was successful in 8.3% of cases (5 patients): 4/9 patients underwent cardioversion and 1 patient had a spontaneous reduction.

The CHADS2VASC risk score averaged 3.20 ± 1.13 between (1-5). It was ≥ 2 in 93.3% of cases. The HAS-BLED score was ≥ 2 in 23.3% of cases.

Anti-thrombotic treatments prescribed were dominated by long-term anti-vitamin K (AVK) in 24 patients (40%), followed by direct oral anticoagulants (AOD) in 16 patients (26.7%), antiplatelet agents (AAP) in 10 patients (16.7%), and low-molecular-weight heparin (LMWH) alone in 6 patients (10%) who had a CHA2DS2-VASc score ≥ 2 and for whom AVK was contraindicated. Four (04) patients (6.6%) received no anti-thrombotic treatment.

Hemodynamic complications (heart failure and/or cardiogenic shock) and thromboembolic complications (ischemic stroke and intracavitary thrombus) occurred in 37 patients (61.7%) and 12 patients (20%) respectively. Rhythmic collapse occurred in 8 patients (13.3%) and intra-cardiac thrombosis in 6 patients (10%).

AOMI was found in 1 patient (4.5%) . The mortality rate was 11.7% or 7 patients. (Table III).

Table I: Breakdown of patients by progressive type of atrial fibrillation

Type FA	Workforce	Percentage (%)
First Episode	10	11,7
FA Paroxystic	7	15
FA Persistent	13	21,7
FA Prolonged	18	30
FA Permanente	12	20
Total	60	100

Table II: Distribution of AF types by gender

Type FA	Male	Female	Total
FA Prolonged	13	5	18
FA Persistent	4	9	13
FA Permanent	6	6	12
First episode FA	3	7	10
Paroxysmal AF	2	5	7
Total	28	32	60

P=0,087

Table III: Etiology of non-valvular AF

Etiologies	Workforce	Percentage (%)
Hypertensive heart disease	37	61,7
CMD	7	11,7
Ischemic heart disease	5	8,3
Mitral insufficiency	3	5
Aortic insufficiency	2	3,3
Hyperthyroidism	2	3,3
Pulmonary embolism	2	3,3
CPC	1	1,7
Idiopathic	1	1,7
Total	60	100

Table IV: Non-valvular complications of AF

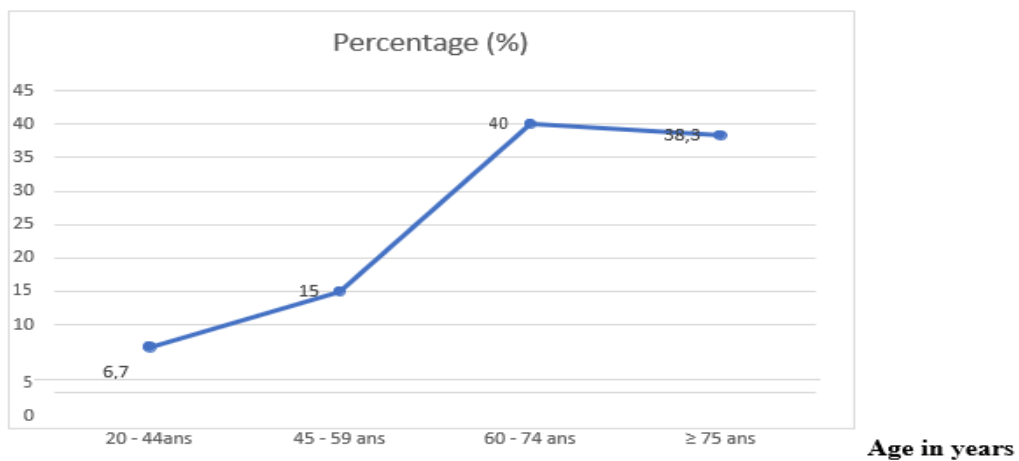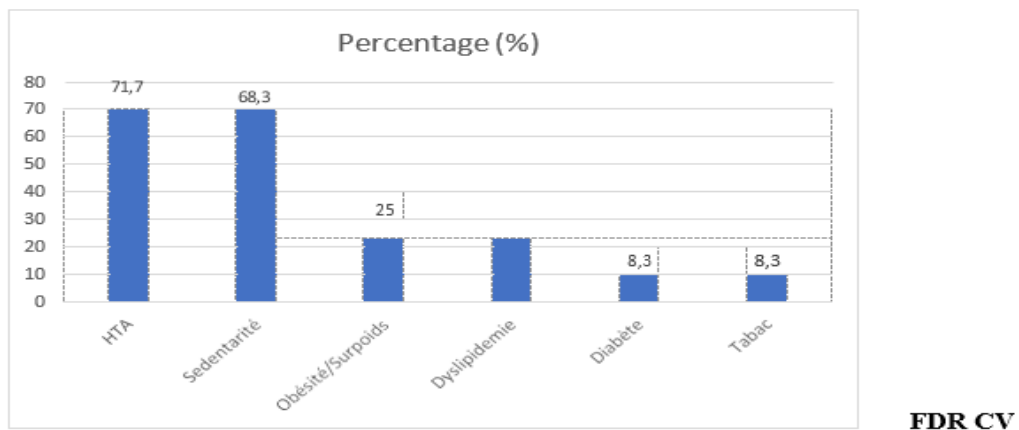| Complications	Workforce	Percentage (%)
Heart failure	37	61,7
AVCI	12	20
Rhythmic collapse	8	13,3
Intra-cardiac thrombosis	6	10
AOMI	1	1,7
Deaths	7	11,7

Figure 1: Patient distribution by age group

Figure 2: Distribution of patients according to cardiovascular risk factors

Discussion

Atrial fibrillation is a major public health problem and the most common rhythm disorder. Hospital prevalence was 7.48% in this study. In Niger, Harouna [9], in 2018 found a similar prevalence of 7.66%. A Kane et al [4] in Senegal in 2021 found a prevalence of 8.24%.

This frequency was higher than those reported in studies by Traoré et al, [10] in Mali in 2021 (4.8%), Mbaye et al, [11] in Senegal in 2010 (5.35%), Sangaré et al, [12] in Mali in 2022 (6.7%). In

contrast, Niakara in Burkina Faso [13], Yomma in Morocco [14] and Manga et al, in Senegal [15] found 18.5%, 10.5% and 12.3% respectively.

Prevalence increases with age, and the mean age of our patients was 66.58 ±14.38 years. In Niger, Bonkano [16] found a mean age of 66.58± 14.38 years. Manga et al in Senegal [15], Boombhi et al, in Cameroon [8] and Sangaré et al, in Mali [12] found respectively 63.05, 65.9 and 61 years. In France, some authors have reported an average age of less than 75 years [17].

This increase in prevalence is in fact due to the parallel increase in associated heart disease, which favours the onset of atrial fibrillation during its course [3].

Females predominated (53.3%), with a sex ratio (M/F) of 0.87. For Manga et al, in Senegal [15] and Doumbia et al, in Mali [18], female gender also predominated, with 54.1% and 60% respectively. Furthermore, according to the literature, male predominance diminishes with age [18].

In the study, hypertension was the main cardiovascular risk factor (71.7%), followed by a sedentary lifestyle and obesity/overweight (68.3% and 25% respectively). In Senegal in 2021, A Kane et al [4] reported hypertension (69.1%) and obesity (11.5%) as the main risk factors. In Mali, the team of Sangaré et al, [12] also reported hypertension as the main risk factor, with 65.40%.

In this study, hemodynamic and thromboembolic complications were observed at 61.7% and 20%. These rates are in line with those found by Niakara in Burkina Faso [13] (55 and 21%). On the other hand, Sangaré et al, in Mali [12] noted higher rates (36.54% and 17.30%).

Following the example of data reported in Black Africa [19]. Boombhi et al, in Cameroon [8] reported a 52.2% rate of non-valvular AF.

In this study, in the majority of cases, AF occurred in patients with underlying heart disease; in our series, 90.90% of patients had underlying heart disease.

These data were similar to those reported by Coulibaly et al, in Côte d'ivoire [20] (88.5%). However, these data are comparable to those reported by Boombhi et al, in Cameroon [8] (82.5%).

Indeed, the association between OG dilatation and the onset of atrial fibrillation is classic: the more dilated the OG, the greater the risk of atrial fibrillation [21].

In terms of evolution, the predominant types of atrial fibrillation are prolonged persistent AF (30%); persistent (21.7%) and permanent (20%). These results are similar to those reported by Boombhi J et al [8]: prolonged persistent (40%); persistent (25%). Comparable to the results of Meiltz et al [22], who found 82% paroxysmal AF, and Kirchlof et al [23], who also found a predominance of paroxysmal AF [24]. This could be explained by the high rate of AF associated with heart disease; in fact, the formation of an atrial structural substrate with dilation of the latter is conducive to chronic forms of AF [8]. This would explain the insufficient therapeutic strategy for rhythm control (15%) of patients in our environment, as reported in several studies carried out in an environment comparable to ours [24].

In this study, we obtained a mean CHA2DS2-VASc of 3.20, with a severity rate (score≥2) of 93.3%. Indeed, several scores have been used to assess thromboembolic risk in a patient in AF.

The 2010 ESC recommendations proposed the CHA2DS2-VASc score, which was retained by the latest 2020 ESC recommendations [2] on AF, to predict thromboembolic risk in non- valvular AF patients. Oral anticoagulation is recommended in men with a CHA2DS2-VASc score ≥ 2 and in women with a CHA2DS2-VASc score ≥ 3.

In our study, we found a mean CHA2DS2-VASc score of 3.20±1.13, with a severity rate (score ≥ 2) of 93.3%. Manga et al in Senegal [15] and Boombhi et al in Cameroon [8] found respectively 86.3% and 80% of patients with a CHA2DS2-VASc score ≥2.

The aim of treatment in AF is to control heart rate, restore sinus rhythm and prevent thromboembolic complications, which remain one of the major complications, essentially strokes, the frequency of

which is multiplied by a factor of 4 to 7 [8].

Prevention of these cardioembolic events was essentially achieved by prescribing antithrombotics in 81.7% of our patients; Boombhi et al, in Cameroon [8] found a similar rate of 81.3%.

Several antithrombotic drugs are available: anti-platelet aggregation agents (APAs), anti- vitamin K agents (AVKs) and direct oral coagulants (AODs).

Indeed, compared with VKAs, AODs have demonstrated their non-inferiority in non-valvular AF, and have the advantage of not requiring regular biological monitoring [14]. When an anticoagulant is indicated in an AF patient eligible for AODs, the latter should be preferred to VKAs (ESC 2020 IA) [2].

However, VKA anticoagulation is the only available option for the prevention of AF in patients with moderate or severe mitral stenosis or mechanical heart prostheses (ESC 2020: IB) [2]. And it should be noted that aspirin has a place in AF only in the context of acute coronary syndrome and/or angioplasty, in association with an anticoagulant (if required by the CHA2DS2-VASc score). Antiplatelet agents have no place as monotherapy for the sole purpose of preventing embolic complications in AF [25].

Anti-vitamin K drugs were prescribed in 40% of cases in our study; this could be explained by the accessibility of these drugs. Indeed, although restrictive with the need for frequent biological monitoring, VKAs remain more available and financially more accessible than direct oral anticoagulants in Niger, which were prescribed in only 26.7% of our patients, as Boombhi also highlighted in Cameroon [8], with a VKA utilization rate of 58.7% and AODs in 12.5%. Antiplatelet agents (acetylsalicylic acid) were used in 18.3% of patients, compared with 13.50% of Sangare patients in Mali [12].

High bleeding risk (HAS-BLED score ≥ 3) was found in 23.3% of our patients.

Heart rate control was the most commonly used therapeutic strategy in 85% of cases. Beta- blockers were used in 75% of cases, followed by digoxin

(8.3%).

In the study by Boombhi et al in Cameroon [8], the molecules used were digoxin (66%), beta- blockers (32.7%) and amiodarone prescribed to 10% of patients.

The rhythm control strategy was used in 15% of our cohort with hemodynamic instability, with 8.3% returning to sinus rhythm.

This frequency control strategy was the most widely used on the African continent and in developing countries, as reported by Strambler et al, with "of rate control" rates ranging from 55% to 87% [24].

The outcome was favorable in 11.7% of patients. Hemodynamic and thrombo-embolic complications such as ischemic stroke were described in 61.7% and 20% of patients respectively. Results comparable to ours were reported by Sangare et al in Mali [12] (36.54% and 17.30%). However, Niakara et al, in Burkina Faso [10] found similar results (55% and 21%).

Finally, in our study, the mortality rate was 11.7%; Manga et al in Senegal [15] found a similar mortality rate of 13.2% and 15.6% in Traoré in Mali [10].

Despite this high mortality in hospital studies, AF in Africa is under-reported in published reports [25]. Study types and populations are highly heterogeneous, making it difficult to draw a definitive conclusion on prevalence and mortality [26-28].

Conclusion

Atrial fibrillation is a common rhythm disorder in hospitalized elderly patients. Prolonged persistent atrial fibrillation and persistent atrial fibrillation were predominant, essentially linked to the presence of underlying heart disease in most of our patients. The mortality rate is relatively high, mainly due to thrombo-embolic complications, hence the need for systemic screening of elderly patients in our environment.

*Correspondence

Abdouramane Moussa Akilou

akiloucisse@yahoo.fr

Conflict of interest : None

References

[1] Rahman F, Kwan GF, Benjamin EJ. Global epidemiology of atrail fibrillation. Nat Rev Cardiol. 2014 ; 11(11) : 639-54

[2] Hindricks G, Potpara T, Dagres N, Arbelo E, Bax JJ, Blomström-Lundqvist C, et al. ESC Scientific Document Group. 2020 ESC Guidelines for the diagnosis and management of atrial fibrillation developed in collaboration with the European Association for Cardio-Thoracic Surgery (EACTS): The Task Force for the diagnosis and management of atrial fibrillation of the European Society of Cardiology (ESC) Developed with the special contribution of the European Heart Rhythm Association (EHRA) of the ESC. Eur Heart J. 2021 Feb 1;42(5):373-498.

[3] Brembilla- Perrot B. F. Fibrillation auriculaire EMC Cardiologie 2018 ; 13 :1-17

[4] A Kane , I Sory2 Sylla, SA Sarr, F Aw, M Bodian, SM Beye, AA Ngaide, MB Ndiaye, A Mbaye, M Diao, Ab Kane, SA Ba. Fibrillation auriculaire non valvulaire des patients hospitalisés : Aspects diagnostiques, étiologiques et évolutifs dans deux centres de référence à Dakar. Cardiologie tropicale 2021, N° 165.

[5] Kirchhof P, Benussi S, Kotecha D, Ahlsson A, Atar D, Casadei B, et al. Guidelines for the management of atrial fibrillation developed in collaboration with EACTS. Eur Heart J 2016;37:2893-2962

[6] Yameogo NV, Mbaye A, Thiombiano P, Ndiaye MB, Bodian M, Kane A et al. La fibrillation atriale non valvulaire : A propos de 118 observations colligées au CHU de Dakar. Médecine Afrique Noire 2012;59(2):279-84

[7] Alanso A, Bengtson LGS. Arinsing Tide: The global Epidemic of atrial Fibrillation. Circulation. 2014 129(8) : 829-30

[8] Boombhi J, Menanga A, Mfeukeu-Kuaté L, Kungni E, Mounpou B, Kingué S. Caractéristiques cliniques et thérapeutique de la fibrillation atriale en milieu hospitalier à Yaoundé, Cameroun. Health Sci Dis 2019 ; 20 :23-26

[9] Harouna DR. Profils épidémiologiques et cliniques de la fibrillation atriale [thèse]. Médecine : Niamey (Niger) ; Université Abdou Moumouni 2018. 69p.

[10] Traoré B, Sidibé S, Kantako K, Mariko S, Kassambara Y, Konaté M et al. La fibrillation atriale à l'hôpital de Tombouctou : Fréquence, étiologie, traitement et évolution. Health Sci Dis 2021 ; 22(7) : 79-82

[11] Mbaye A, Pessinaba S, Bodian M. La fibrillation atraile : Fréquence, facteur étiologique, évolution et traitement dans un service de cardiologie de Dakar, Sénégal. Pan African Medical Journal 2010 ; 6 :1-8

[12] Sangare I, Ba HO, Camara Y, Keïta A,Thiam C, Konaté M et al. Aspects cliniques et therapeutiques de la fibrillation atriale en hospitalisation au CHU Cabriel Toure. Health Sci Dis 2022 23, 77-80

[13] Niankara A. Les fibrillations atriales valvulaires et non valvulaires au Burkina Faso. Etude comparative à propos de 58 cas colligés au CHU-YO. Mémoire DES cardiologie, Med, Bamako, 2012

[14] Yomma D. Arythmie complète par fibrillation auriculaire : étiologies et prise en charge Thèse,

Med, Marrakech, 2015, N°46

[15] Manga SJ, Djegni GV, Kane A, Sy SL, Te QI. Aspects épidemiologiques, étiologiques et thérapeutiques de la fibrillation auriculaire en milieu hospitalier à Ziguinchor (Sénégal). Jaccr Africa 2022, 6(1) : 283-289

[16] Bonkano Soumana A. Fibrillation atriale : aspects épidemiologiques, cliniques, paracliniques et thérapeutiques à l'hopital national Amirou Boubacar Diallo de Niamey (HNABD). Mémoire de fin de cycle DES cardiologie. Université Abdou Moumouni Dioffo de Niamey/ Niger 2020, N°001

[17] Da Costa A, Roméyer-Bouchaud C, Bisch L, Khris L, Isaaz K. La fibrillation auriculaire : Enjeux épidémiologiques, définition, nosologie, médico-économie. Ann Cardiol Angeiol. 2009 ; 51: S3–S5.

[18] Doumbia CT, Sanfo B, Fofana D, Maiga AK, Camara Y, Diallo S et al. Etiologie et classification des fibrillations atriales dans le service de cardiologie du CHU Mère-enfant Le Luxembourg (Bamako). Health Sci Dis 21(3) 2020 87-89

[19] Yameogo N, Mbaye A, Thiombiano P, Kagambega L, Pessinaba S, Ndiaye M et al. La fibrillation atriale non valvulaire A propos de 118 observations colligées au CHU de Dakar. Med Afr Noire 2012 ; 59(2):279-84

[20] Coulibaly I, Anzouan-Kacou JB, Kouao Konin C, Kouadio SC, Abouo-N'Dori R. Fibrillation auriculaire : épidémiologie à l'institut de cardiologie d'Abidjan (Côte d'Ivoire). Med Trop 2010 ; 70: 371-374

[21] Thiombiano LP. Fibrillation auriculaire en milieu hospitalier : données épidémiologiques, diagnostiques et thérapeutiques, Etude rétrospective sur cinq ans (2003-2008) dans le service de cardiologie de l'hôpital General de Grand Yoff Thèse, Med, Dakar, 2009, N°21

[22] Meiltz A, Zimmermann M, Urban P, and Bloch A: Atrial fibrillation management by practice cardiologists: a prospective survey on the adherence to guidelines in the real world. eun.2008; 108-63.

[23] Kirchhof P, Ammentorp B, Darius H, De Caterina R, Le Heuzey J-Y, Schilling RJ, et al. Management of atrial fibrillation in seven European countries after the publication of the 2010 ESC Guidelines on on atrial fibrillation: primary results of the Prevention of thromboembolic events. European Registry in Atrial Fibrillation (PREFER in AF). EP Eur. 2014; 16(1):6-14

[24] Stambler B, Ngunga L. Atrial fibrillation in Sub-Saharan Africa: epidemiology, unmet needs, and treatment options. Int J General Medicine 2015 :8 231–242

[25] Hink U, Voigtländer T. Necessity of Antiaggregation and Anticoagulation and Its Prognostic Impact: A Cardiologist's View. Visc Med. 2020;36(4):64-273.

[26] Patel PJ, Deo R. Atrial fibrillation in sub-Saharan Africa: Not so black and white? J Cardiovasc Electrophysiol. 2019 ;30(12):3017-9.

[27] Jacobs MS, van Hulst M, Adeoye AM, Tieleman RG, Postma MJ, Owolabi MO. Atrial Fibrillation in Africa-An Under-Reported and Unrecognized Risk Factor for Stroke: A Systematic Review. Glob Heart. 2019 ;14(3):269-79.

[28] Gibbs H, Freedman B, Rosenqvist M, Virdone S, Mahmeed WA, Ambrosio G, Camm AJ, et al. Clinical Outcomes in Asymptomatic and Symptomatic Atrial Fibrillation Presentations in GARFIELD-AF: Implications for AF Screening. Am J Med. 2021; 134(7):893-901.e11.

To cite this article :

A Abdouramane, B Dodo, I Ousmane, O Abdoulaye, M Garba, A Anaba et al. Epidemiological and clinical characteristics of non-valvulair atrial fibrillation in Agadez, Niger. Jaccr Africa 2024; 8(1): 46-54