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Clinical characteristics of patients based on the POL-AF registry compared to the registries of the pre - NOACs era. Do we still treat the same individuals?

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Abstract

Background: Atrial fibrillation (AF) is the most common arrhythmia in adults and the most common arrhythmia requiring hospitalization. This paper, taking into account the latest Polish POL-AF registry results, attempts to answer whether and how currently hospitalized patients with AF differ in clinical profile from patients a decade ago and earlier.

Methods: The Polish Atrial Fibrillation (POL-AF) Registry is a multicenter, prospective, observational study including hospitalized patients with AF in ten cardiology centers in 2019.

Results: During the study period, 3,999 patients with AF were included in the POL-AF registry. The average age of patients enrolled was 72,1 years, with 42,6% female. The most prevalent concomitant conditions were arterial hypertension (83,6%) and chronic heart failure (65,5%). Other comorbidities commonly present were coronary artery disease (50%), valvular heart disease (37%) and diabetes mellitus (34,1%). The history of a previous stroke/TIA was reported in 17,4% of the patients. The mean CHA2DS2-VASc score and HAS-BLED score were 4,35 and 2,69, respectively.

Conclusion: The POL-AF Registry is the newest and largest multicenter registry on AF in hospitalized patients in Poland and one of the most up-to-date registries of this type in Europe. Compared to years before the NOACs era, we currently treat increasingly younger AF patients, who are burdened with a growing number of comorbidities in particular hypertension, heart failure, vascular diseases, chronic kidney disease, thyroid diseases, previous stroke, diabetes and obesity.

What's new?

Based on the data from the newest and the most significant multicenter study concerning Polish hospitalized patients with atrial fibrillation we can state that present-day patients compared to ones before the NOACs era, are younger, burdened with a growing number of comorbidities in particular hypertension, heart failure, vascular diseases, chronic kidney disease, thyroid diseases, previous stroke, diabetes and obesity. The results can be related to a vast community of atrial fibrillation patients worldwide.

Abbreviation: AFFIRM: The Atrial Fibrillation Follow-up Investigation of Rhythm Management Study; EHS: Euro Heart Survey; FRACTAL: The Fibrillation Registry Assessing Costs Therapies, Adverse events and Lifestyle; ATRIA: Anticoagulation and Risk Factors in Atrial Fibrillation; SNP: Swedish National Patient Register; US Market: the US Market Scan database; AFNET: The German Competence NETwork on Atrial Fibrillation; RECORD AF: Registry on Cardiac Rhythm Disorders Assessing the Control of Atrial Fibrillation; WHR: Western Hospital Registry

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Introduction

Atrial fibrillation is the most common arrhythmia in adults regardless of the world's region and the most common arrhythmia requiring hospitalization [1,2]. The morbidity is a cardiovascular pandemic, affecting more than 33 million people around the globe. Each year, we record over 5 million new cases of AF [3]. This situation carries enormous social and economic costs, which is a great challenge for healthcare systems, regardless of how they are organized and financed.

Currently, the estimated prevalence of AF in the general population is 2-4% [1], which is at least twice the rate estimated twenty years ago. The lifetime risk of AF in a person aged 55 is currently as high as 37% [4,5]. The increase in the prevalence of AF can be attributed both to better detection of clinically silent AF as well as the population ageing and the increase in the prevalence of AF-favorable conditions. The incidence of AF is almost 3.5 times higher among men, especially of the Caucasian race, compared to women. Approximately 70% of AF patients are over 70 years [3]. Age is an essential AF risk factor. Other important risk factors of AF are hypertension, diabetes, heart failure, coronary heart disease, chronic renal failure, obesity and obstructive sleep apnea [6].

Looking from the perspective of clinical practice in the last 20 years, one cannot help feeling that AF patients' profile has changed significantly in favor of people considerably younger, potentially healthier, less burdened with comorbidities than in the previous decade. While at the beginning of the 21st-century patients with AF under 50 were extremely rare, in 2020, such patients are commonplace in our clinical practice. The number of people aged 50-60 with first AF episodes is also growing. We observe a continuous increase in the number of AF-related hospitalizations. The highest increase concerns the age group 35-49 years (about 17%), slightly fewer patients >80 years of age (about 15%) and patients aged 50-64 (about 10%) [2]. Are these observations and data from population studies supported by the latest AF registry studies? Do we treat the same patients in the non-vitamin K antagonist oral anticoagulants (NOAC) era as in the time of vitamin -K antagonists (VKA) and aspirin only? This paper, considers the results of the latest Polish POL-AF registry attempts to answer these questions.

Methods

Study group

The Polish Atrial Fibrillation (POL-AF) registry is a multicenter, prospective, observational study that includes patients with AF from ten independent cardiology centers with different reference levels. The data was collected from January to December 2019. The registry aimed to obtain the data concerning detailed baseline clinical characteristics of all AF patients and to evaluate the studied population in terms of upstream therapy and anticoagulation treatment. Consecutive patients over 18 years of age, with AF confirmed with electrocardiographic examination or documented in medical records, admitted electively or urgently to cardiology centers, were added to the survey. No exclusion criteria were defined to avoid a biased selection of patients and get results as close to "real life" as possible. In the presented study based on the POL-AF registry, baseline characteristics of the studied population were evaluated.

To compare the POL-AF registry data with the data from the registries before 2010, we searched PubMed databases and selected ten registries from years 1995-2010 assesing similar demographic and clinical variables as our survey.

Analyzed data

Critical data connected with demography, medical history, AF type, laboratory tests, and pharmacotherapy were collected independently in each center participating in the study. The thromboembolic risk was estimated based on CHA2DS2-VASc score (congestive heart failure, hypertension, age ≥75 years, diabetes, stroke/transient ischemic attack, vascular disease (prior myocardial infarction, peripheral artery disease, or aortic plaque), age 65-74 years, sex) [6]. Bleeding risk was assessed according to HAS-BLED (Hypertension, Abnormal renal/liver function, Stroke, Bleeding, Labile INR, Elderly (>65 years), Drug/Alcohol consumption) [6].

Laboratory tests included blood chemistry evaluating predominantly renal and liver function, as well as morphology parameters. Estimated glomerular filtration rate (eGFR) was calculated from the Modification of Diet in Renal Disease or Chronic Kidney Disease Epidemiology Collaboration formula. BMIs were calculated based on patients' height and weight. The available echocardiography results were analyzed for systolic and diastolic function and valve disorders. The local Ethics Committee approved the study protocol and waived the requirement of obtaining informed consent from the patients to participate in the study. The study is registered in the Clinical Trials database -NCT04419012.

Statistical analysis

The statistical analysis was performed using RStudio Desktop 1.3.1093 (open-source statistical software). Continuous variables were presented as means and categorical variables as absolute and relative frequencies (percentages). Age is the only continuous feature. The statistical test aiming at measuring the significance of occurence of a feature between two samples is the test for proportions (prop. test in RStudio). The prop. test performs a two-sample test for proportions and gives a confidence interval for the difference in proportions as part of the output. In addition, it calculates p-value from the chi-square test. For the two-sample situation, the test takes as arguments values representing the number of events in each of the two groups and values representing the number of subjects in each of the two groups. To test the null hypothesis of no difference between the two proportions, the two-tailed p-value test is used with a conventional alpha level of 0.05. Results, where p-value was less than the significance level, were considered significant.

Results

During the study period, 3,999 patients with AF were included in the POL-AF registry. Their baseline characteristics are detailed in Table 1.

The mean age was 72,1 years. Women constituted 42,6% of the cohort. At the time of enrolment into the registry, 48% presented with paroxysmal AF, 23,3% with persistent, 28,6% with permanent. Atrial flutter was reported in approximately 9% of patients. The most prevalent concomitant conditions were arterial hypertension (83,6%) and chronic heart failure (65,5%). Other comorbidities commonly present were coronary artery disease (50%),valvular heart disease (37%) and diabetes mellitus (34,1%). Active smoking was observed in 11,2 % of patients. The high proportion of patients with valvular heart disease was mostly due to a high prevalence of mitral valve regurgitation, which was reported to be present in 25% of all patients. Non-cardiac diseases frequently present were renal failure (30,2%), thyroid disease (18,2%) and chronic obstructive pulmonary disease (8,8%). Previous thromboembolic events were common and present with a frequency of 13,0%. The history of a previous stroke/TIA was found in 17,4% of

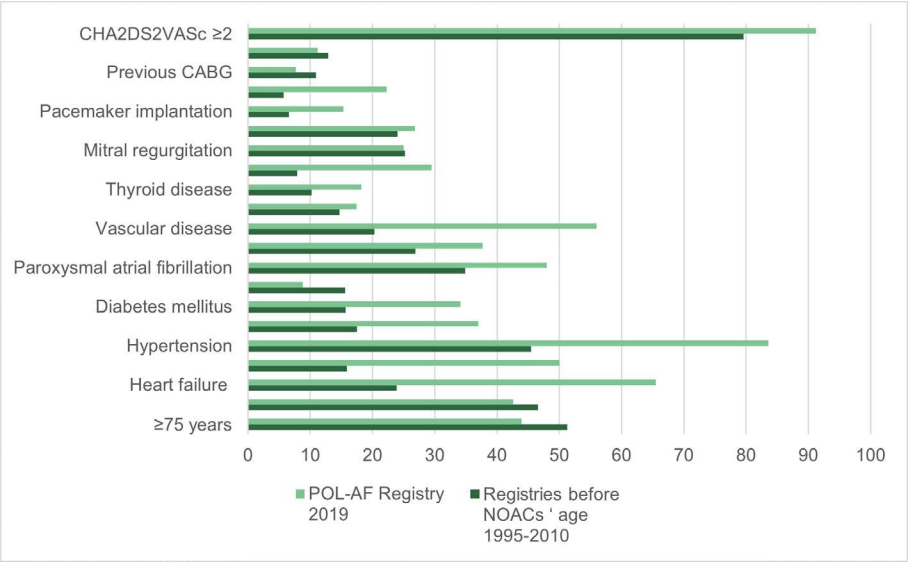

Figure 1. Comparison of pivotal pre -NOACs era registries with the POL-AF Registry BMI- body mass index, EF-ejection fraction, TIA- transient ischemic attack, CABG-coronary artery bypass grafting, $CHA_2DS_2VASc \geq 2$ (congestive heart failure, hypertension, age ≥75 years, diabetes mellitus, stroke/transient ischemic attack, vascular disease, age 65–74 years, sex category)

Table 1. Baseline characteristics of the POL-AF Registry patients; Continuous variables are reported as median, categorical variables as number (percentage).

All patients n (%)	3999 (100)
Mean age, years (SD)	72,1 (11,4)
Female gender	1704 (42,6)
Heart failure	2621 (65,5)
Coronary artery disease	2011 (50,0)
PAD	582 (14,5)
Hypertension	3344 (83,6)
Valvular heart disease	1497 (37,0)
Diabetes mellitus	1366 (34,1)
Chronic obstructive pulmonary disease	354 (8,8)
Paroxysmal atrial fibrillation	1923 (48,0)
EF <50%	1179 (29,4)
VAS-vascular disease	2243 (56,0)
Stroke	508 (12,7)
TIA	190 (4,7)
Thyroid disease	730 (18,2)
Hypothyroidism	450 (11,2)
Chronic kidney disease	1029 (25,7)
Mitral regurgitation	960 (25,0)
BMI>30	1073 (26,8)
ICD/CRT	295 (7,3)
Pacemaker implantation	614 (15,3)
Previous myocardial infarction	894 (22,3)
Previous CABG	311 (7,7)
Current smoker	411 (11,2)
PCI-percutaneus coronary intervention	918 (22,9)
History of gastrointestinal bleeding	155 (3,9)
$CHA_2DS_2VASc \geq 2$	3647 (91,2)
Mean CHA_2DS_2VASc score (SD)	4,35 (1,7)
Mean HAS-BLED(SD)	2,69 (0,9)
HAS-BLED ≥3	2267 (56,7)

Abbreviations: SD-standard deviation, BMI-body mass index, PAD-Peripheral artery disease, EF-ejection fraction, , $CHA_2DS_2VASc \geq 2$ (congestive heart failure, hypertension, age ≥75 years, diabetes mellitus, stroke/transient ischemic attack, vascular disease, age 65–74 years, sex category), HAS-BLED (Hypertension, Abnormal renal/liver function, Stroke, Bleeding, Labile INR, Elderly >65 years, Drug/Alcohol consumption), ICD- implantable cardioverter defibrillator, CRT- cardiac resynchronization therapy, TIA- transient ischemic attack, CABG-coronary artery bypass grafting

patients. The mean CHA2DS2-VASc score and HAS-BLED score were 4,35 and 2,69, respectively. Over 91% of patients had a high risk of stroke (CHA_2DS_2-VASc score ≥2). Only 2,3 % of patients were reported to have 0 points in the CHA2DS2-VASc score. 56,7 % of the studied patients had a high risk of bleeding. The average BMI was 29,2 kg/m2. Obesity with BMI >30 was noticed in 26,8%.

22,6% patients of the studied cohort had a history of cardiac device implantation twice more frequently pacemakers (15,3%) than Implantable Cardioverter-Defibrillators (ICD) or cardiac resynchronization therapy (CRT) device (7,3%).

To answer the central question of this paper, we summarized the data on patients' clinical characteristics from the available large European and American registries kept in 1995-2008 as well as from two smaller Polish registries from 2006-2010 [7-18]-details in Figure 1 and Table 2.

The registries that were considered for comparison with the POL-AF registry and the patients' clinical characteristics are presented in Table 3.

Compared to the patients treated before NOACs age, present-day patients with AF are younger 72,1 versus 74,4 years, with a smaller number of patients over 75 years: 43,9 % versus 51,3% but with a significantly greater number of patients at high risk of thromboembolic events (91,2% and 79,6%, respectively; all P- values <0,001). Nowadays, women constitute a smaller group of patients with AF than before: (42,6% and 46,6%, accordingly; P-value <0,001).

Both hypertension and coronary artery disease, as well as heart failure, valvular disease and vascular disease, were more commonly reported in present-day patients with AF (all P-values < 0.001).

Conversely, active smoking, chronic obstructive pulmonary disease, and previous CABG were more likely to have occurred in AF patients a decade ago and earlier (P-value <0,001).

Paroxysmal AF was more prevalent in the POL-AF registry than in the period before 2010 (48% and 34,9%, respectively; P-value <0,001).

Among concomitant risk factors, diabetes was more than twice likely to be reported in present-day patients with AF (34,1% and 15,7%, respectively; P-value <0,001).

Table 2. Comparison of registries before 2010 with the POL-AF Registry

Characteristics	***Registries before*** *NOACs ' age* *1995-2010*	***POL-AF Registry*** *2019*	***P- value***
All patients	477437	3999	-
Mean age, years	74,4	72,1	-
≥75 years	69752/136065 (51,3)	1757/3999 (43,9)	<0,001
Female gender	222857/477437 (46,6)	1704/3999 (42,6)	<0,001
Heart failure	114140/477437 (23,9)	2621/3999 (65,5)	<0,001
Coronary artery disease	53793/337017 (15,9)	2011/3999 (50,0)	<0,001
Hypertension	217225/477437 (45,5)	3344/3999 (83,6)	<0,001
Valvular heart disease	7767/44344 (17,5)	1497/3999 (37,0)	<0,001
Diabetes mellitus	74962/477437 (15,7)	1366/3999 (34,1)	<0,001
Chronic obstructive pulmonary disease	29845/190851(15,6)	354/3999 (8,8)	<0,001
Paroxysmal atrial fibrillation	8859/25365 (34,9)	1923/3999 (48,0)	<0,001
EF <50%	2267/8432 (26,9)	1179/3123 (37,7)	<0,001
Vascular disease	53159/261700 (20,3)	2243/3999 (56,0)	<0,001
Stroke/TIA	70087/477437 (14,7)	698/3999 (17,4)	<0,001
Thyroid disease	20087/196758 (10,2)	730/3999 (18,2)	<0,001
Chronic kidney disease	2003/25365 (7,9)	1029/3999 (25,7)	<0,001
Mitral regurgitation	3435/13642 (25,2)	960/3999 (25,0)	0,136
BMI>30	2223/9263 (24,0)	1073/3999 (26,8)	<0,001
Pacemaker implantation	378/5678 (6,6)	614/3999 (15,3)	<0,001
Myocardial infarction	11668/204847 (5,7)	894/3999 (22,3)	<0,001
Previous CABG	528/4673 (10,9)	311/3999 (7,7)	<0,001
Current smoker	1961/15170 (12,9)	411/3999 (11,2)	<0,001
$CHA_2DS_2VASc \geq 2$	105729/121280 (79,6)	3647/3999 (91,2)	<0,001

Abbreviations: BMI- body mass index, EF-ejection fraction, TIA- transient ischemic attack, CABG-coronary artery bypass grafting,$CHA_2DS_2VASc \geq 2$ (congestive heart failure, hypertension, age ≥75 years, diabetes mellitus, stroke/transient ischemic attack, vascular disease, age 65–74 years, sex category)

Table 3. Comparison of registries in years 1995-2010

Characteristics	***AFFIRM study*** *1995-1999*	***Danish Study*** *1997-2006*	***EHS*** *2003-2004*	***FRACTAL Study*** *1997*	***ATRIA Study*** *1996-1997*	***SNP Registry*** *2005-2010*	***US Market*** *2003-2007*	***AFNET*** *2004-2006*	***RECORD -AF*** *2007-2008*	***WHR*** *2006-2010*	***RECORD AF-POL*** *2007*
All patients	4060	121280	5333	1005	17 974	140 420	171 393	9 582	5604	613	303
Mean age	69,7	NA	66,7	65,9	71,2	77,2	73,5	68,4	66,0	74,8	63,0
Age ≥75 years	NA	54,0	27,7	NA	NA	NA	NA	29,2	NA	NA	NA
Female gender	39,0	46,6	42	39,6	43,4	50,1	45,2	38,9	42,8	51,2	42,6
HF	23,0	18,8	33,6	18,2	29,2	31,9	19,7	29	25,9	61,7	27,8
CAD	38,0	16,7	32,7	24,6	34,6	NA	11,6	28,1	18,0	43,1	18,9
Hypertension	71,0	39,7	63,7	48,8	49,3	43,8	47,2	69,2	68,0	65,9	71,5
VHD	12,0	NA	26,3	17,3	4,9	NA	NA	36,3	19,3	36,4	22,7
DM	20,0	9,1	18	11,8	17,1	16,4	19,1	21,7	15,7	25,4	12,3
COPD	15,0	NA	13,3	NA	NA	NA	16	11,4	NA	17,3	NA
PAF	31,0	NA	29	NA	NA	NA	NA	30,2	52,3	43,3	57,9
EF <50%	32,0	NA	NA	NA	NA	NA	NA	NA	22,0	NA	NA
Vascular disease	NA	16,7	NA	NA	NA	23,4	NA	NA	NA	NA	NA
Stroke /TIA	13,0	NA	5,5/5	7,4	8,9	15,2/5,7	7,5	6,4/3,5	5,7/4	16,5	2,7/2,3
Thyroid disease	12,0	NA	9,4	NA	NA	NA	10.1	12,1	9,0	12,0	4,4
Renal failure	1.8	NA	5,8	NA	NA	NA	NA	11,6	6,0	27,7	5,3
Mitral regurgitation	20,0	NA	NA	NA	NA	NA	NA	29,1	NA	NA	NA
BMI>30	21,9	NA	25,0	NA	NA	NA	NA	NA	NA	NA	NA
MI	17,0	NA	14,5	NA	9.4	NA	4,6	NA	9,0	23,8	NA
Current smoker	14,0	NA	NA	NA	NA	NA	NA	NA	13,0	NA	14,6
$CHA_2DS_2VASc \geq 2$	NA	79,6	NA	NA	NA	NA	NA	NA	NA	NA	NA
BMI	29,0	NA	28,0	NA	NA	NA	NA	27,7	28,4	NA	NA

Abbreviations: NA-not available, COPD-Chronic obstructive pulmonary disease, PAF-Paroxysmal atrial fibrillation, HF- heart failure, CAD-Coronary artery disease, BMI- body mass index, VHD- Valvular heart disease, DM- Diabetes mellitus, MI- Myocardial infarction, $CHA_2DS_2VASc \geq 2$ (congestive heart failure, hypertension, age ≥75 years, diabetes mellitus, stroke/transient ischemic attack, vascular disease, age 65–74 years, sex category)

In 2019 AF patients had more prevalent non-cardiac comorbidities, such as thyroid disease, previous stroke / TIA, obesity, and chronic kidney disease (all P-values < 0,001).

Discussion

The POL-AF registry is one of the most recent and up-to-date registries in Europe concerning the clinical characteristics of AF patients and their treatment.

Contrary to randomized clinical trials (RCTs), clinical registries on AF can better describe the real-life population and contemporary clinical practice than RCTs.

As mentioned in the introduction, AF now occurs in increasingly younger people which was confirmed in the presented registry with an average age of 72.1 years and proves consistent with data from other registries kept in the last few years. Examples include the Japanese registries: RAFFINE [19] with an average age of 72.6 and SAKURA AF [20] - 72.0, the international registry GARFIELD-AF [21] with an average age of 69.7 years and GLORIA-AF [22] - 71 years, as well as the European EORP-AF registry [23] with the mean age of 71 years. The increase in the percentage of young patients with AF requiring hospitalization, especially those between 35-49 years of age, was already noticed at the end of the first decade of the 21st century, just before the NOACs era [2]. Most of the currently hospitalized AF patients in Poland are under 75 years old. A similar fact was also ascertained in the GARFIELD-AF registry where patients in this age group figured more than 60% [24].

Since 2000, a gradual decrease in hospitalization has been observed in women compared to men. While 20 years ago, the percentage of hospitalization among women with AF was even 55% [2], it is now just above 40%. The proportion of women in the presented study was 42.6% and remains at a similar level to other contemporary observational studies such as GARFIELD-AF (44. 2%), PREFER AF (40. 0%) [25], EORP-AF (40. 4%) or CRAFT (40. 2%) [26].

Heart failure and atrial fibrillation are two common cardiovascular disorders that often complicate one another. In the studied population, heart failure at discharge was diagnosed in over 65% of patients, i.e. about three times more often than in most pre-2010 observational studies such as AFFIRM [8], Euro Heart Survey [9], ATRIA [11], RECORD- AF [15] and AFNET [13], as well as in current registries: GARFIELD-AF, ORBIT AF II [21] and EORP-AF.

One of the main reasons for such large differences in HF prevalence in the studied populations is the choice of centers participating in observational studies: large metropolitan university hospitals participating in RCTs and international registers versus smaller tertiary and district hospitals.

To the POL-AF study some secondary hospitals were invited which, due to the specific geographical location and nature of their activity, treat less selected patients, paradoxically more burdened with comorbidities than patients in centers of the highest reference.

Another reason may be that the POL-AF registry applies only to hospitalized patients, which defines the studied population as higher cardiovascular risk than the outpatient one. Multicenter hospital-only surveys are rare. An example is the GLORIA-AF registry kept in 2011-2014. In the European cohort of that study, HF patients amounted to 23.4%, which is almost three times less than in Poland today.

CHA_2DS_2-VASc ≥2 and HAS-BLED ≥3 are recognized markers of high complications risk.

In the studied population, the average number of points on the CHA_2DS_2-VASc score was 4.35 compared to 3.0 points in the EHS study, 3.2 points in GLORIA-AF and GARFIELD AF, 3.9 in ORBIT -AF, 3.24 in EORP AF.

The percentage of patients with CHA_2DS_2-VASc ≥2 in the studied population was as high as 91.2% compared to 79. 6% reported in the records ten years ago.

The mean HAS-BLED score in our registry was 2.69. The percentage of patients with high and very high bleeding risk was 56.7%, which is a vast difference compared to 21.3% in ESH.

The prevalence of CAD in the studied population, estimated at 50%, i.e. over three times more than 10-20 years ago and almost twice as much as reported by large contemporary registries such as EORP-AF -29.3%, GARFIELD AF - 19.4% or ORBIT AF II 26.6%. It seems that the reasons for such large differences are similar to those described for HF.

Hypertension (HT) is considered to be the primary independent risk factor for atrial fibrillation. In our registry, HT was present in almost 84%, compared to 45% of patients before 2010. In general, all current European registries report the prevalence of hypertension at about 70-85%, which is higher than two decades ago.

Another parameter evaluated in the POL-AF registry was the coexistence of AF and type 2 diabetes mellitus (T2DM). The latest estimates show a global prevalence of 425 million people with diabetes in 2017, which is expected to rise to 629 million by 2045 [27]. This is fueled by the worldwide rise in the prevalence of obesity and unhealthy behaviors, including poor diet and physical inactivity [28]. Given the high prevalence of AF and T2DM in the general population, these conditions' frequent coexistence is not surprising. Up to 20% of patients with AF had T2DM- before 2010. Currently, in the presented registry, it is already 34%.

The number of people with BMI> 30 and AF is also significantly higher now than several years ago. This is interesting given that in our registry obesity was found in almost every third AF patient. The growing number of obese people is also evident in other contemporary registries, such as ORBIT-AF or EORP-Pilot [29].

Vascular diseases such as atherosclerosis, peripheral artery disease, myocardial infarction, aortic plaque are inextricably linked to T2DM and obesity. Their presence in the studied population was found in 56% compared to 20% of patients a decade or more ago. The number of AF patients with a history of MI increased (22.3% vs 5.7%), which most likely is related to the new definition of myocardial infarction based on determining of troponins, i.e. much more sensitive markers of myocardial necrosis than the previously used CPK or CKMB.

As mentioned in the introduction, the number of people with AF has been gradually increasing over the last 20-30 years. Atrial fibrillation, especially in the paroxysmal form (PAF), affects younger and younger people. In the studied population, PAF was the most common form of AF (48.0%), significantly more frequent than before (34.9%).

An increasing number of hospitalized patients with AF have a history of stroke or TIA. There were 17.4% of such patients in the study group, compared to 14.7% in the registries before 2010. This proportion is consistent with the data from other similar studies conducted in recent years. For example, in the Italian AIFA registry [30] kept in 2013-2017 in a group of over 700 000 patients, the percentage of people after stroke / TIA was 18.3%.

Another critical problem is chronic kidney disease, the percentage of which is now more than four times higher than in the past. In our registry, the criterion used for diagnosis of renal failure was GFR <50 ml/min, i.e. one that requires a change in the dosage of some NOACs and which at the same time significantly increases the risk of cardiovascular events and death. In the in-patients RAFFINE registry a few years ago, the proportion of patients with chronic kidney disease was 26.5% versus 30.2% in POL-AF, what compared to 1.8% in the AFFIRM study or 5.8% in the Euro Heart study Survey makes a huge difference.

It also comes as a big surprise that almost every 5th patient with AF in our registry had a thyroid disorder defined as TSH out of range. For comparison, in the EORP-AF registry seven years ago, the percentage of patients with thyroid diseases was about 15% and in the EHS study 17 years ago only 9. 4%.

Conclusion

In summary, the presented registry is the newest and the most significant multicenter study concerning Polish hospitalized patients with atrial fibrillation and one of the most up-to-date records of this type in Europe. Participation in the study, apart from university hospitals, also district hospitals, gives a more reliable picture of AF patients similar to everyday clinical practice in our country. The results of the registry are broadly consistent with our observations and experiences of the last 20-30 years. We are treating increasingly younger patients with AF, burdened with a growing number of comorbidities, particularly hypertension, heart failure, vascular diseases, chronic kidney disease, thyroid diseases, previous stroke, diabetes and obesity. Taking into account the above conclusions, the essential issue that may limit the AF epidemic seems to be the fight against obesity, leading to the development of T2DM as well as vascular diseases, heart failure and hypertension. Effective obesity reduction should be the overriding goal of the health and preventive policies in the modern world.

Patients' clinical characteristics from the POL-AF registry are analogous to those presented in other contemporary international registries, which allows us to relate our results to a vast community of AF patients worldwide.

Limitation

The design of the POL-AF Study included only hospitalized patients. Thus, the clinical characteristics of POL-AF patients reflect more coexisting severe diseases and conditions than the general population of patients with atrial fibrillation. Data from ten hospital centers out of approximately nine hundred and fifty in Poland do not reflect the full clinical profile of hospitalized AF patients. We did not include in the registry internal medicine departments where a significant amount of AF patients are hospitalized what also could have had an impact on the survey results.

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Contribution statement

- Conception and design: JB, EBO, IG
- Administrative support: JB
- Provision of study materials or patients: JB, EBO, BU-Ż, MM, MW, RB, TT, RR-S, J.B, MW, A.S, MK, ATK, AS, M.W, AM.
- Collection and assembly of data: JB, EBO, IG, OJ, BU-Ż, MM, MW, RB, RR-S, TT, J.B, MW, A.S, MK, MG, AK-C
- Data analysis and interpretation: JB and EBO.
- Manuscript writing: JB
- Final approval of manuscript: All authors

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