DOI: 10.5455/msm.2018.30.4-9

Received: November 29 2017; Accepted: January 04, 2018

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ORIGINAL PAPER

Mater Sociomed. 2018 Mar; 30(1): 4-9

Atrial Fibrillation in Hypertension: Patients' Characteristics

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ABSTRACT

Background: The most common risk factor for Atrial Fibrillation (AF) development is hypertension.

Purpose: to explore patients' characteristics associated with AF caused by hypertension. **Methods:** The sample of the study included 170 patients with AF caused by hypertension. Data collection was performed by the method of interview using a questionnaire developed by the researchers of the study for the collection of demographic, clinical and other patients' characteristics. **Results:** Regarding type of AF, 21.9% of the patients had paroxysmal AF while 64.5% and 13.6% had persistent and permanent AF, respectively. Patients who had persistent AF were receiving anticoagulants and antiarrhythmics at a higher percentage (88.8% and 82.2%, respectively) than patients with paroxysmal (69.4% and 72.2%, respectively) or permanent AF (69.6% and 56.5%, respectively). Patients with persistent AF had at a lower percentage their blood pressure controlled than patients with paroxysmal or permanent AF (85.3% vs. 97.3% and 95.7%, respectively). Patients with permanent AF had at a higher percentage >5 years onset of their heart problem (47.8%) than patients with paroxysmal or persistent AF (10.8% and 8.3%, respectively). Patients with permanent AF had at a higher percentage previous hospitalization due to AF (69.6%) than patients with paroxysmal (40.5%) or persistent AF (62%). Lastly, patients with persistent AF were very informed about the state of their health at a higher percentage (33%) compared patients with paroxysmal or permanent AF (13.5% and 26.1%, respectively). **Conclusions:** The present study revealed patients' characteristics that may be helpful when planning nursing interventions or guiding clinical decision-making.

Keywords: atrial fibrillation, hypertension, risk factors, complications.

1. INTRODUCTION

Atrial fibrillation (AF) is the most common chronic and clinically significant cardiac arrhythmia associated with mortality, morbidity and increased risks for death. The predominant reasons for AF development include advanced age, hypertension, myocardial infarction, heart failure, and valvular heart disease (1-3). This arrhythmia is more frequent in men, with a lifetime risk 1 in 4 for men (1, 2). AF incidence is age-related (1, 2, 4) with almost 50% of patients to be above 75 years old (5, 6).

AF is affecting approximately 2.3 million people in the United States. According to estimates, by 2050 more than 5.6 million Americans will develop AF of whom 50% will be over 80 years (1). Similar rise trends are anticipated in Europe as the number of AF patients in 2030 is expected to be nearly 14-17 million while the number on new AF cases will be per year at 120.000-215.000 individuals (6). This complex disease imposes an enormous health burden as it increases the risk of stroke and thromboembolism and leads to adverse hemodynamic effects and decreased exercise tolerance. AF accounts for 20% of all strokes and this number reaches 25% in patients aged >80 years (1,2). Also high is the prevalence of silent strokes in AF patients mainly after ablation procedures (7, 8). AF patients have a five-fold and two-fold higher risk of stroke and death, respectively (6).

Treatment of this arrhythmia includes hemodynamical stabilization of patient, heart rate and rhythm control as well as prevention of stroke (2). Moreover, the disease is associated with increased health care utilization (hospitalizations, emergency room visits, and outpatient visits) and reduced quality of life mostly attributed to anatomic, hemodynamic, and hemocoagulative consequences and to symptoms' burden (5,6). Equally accountable for diminished quality of life

are socioeconomic problems, and absence from work due to disability or cognitive disturbance (6-8).

Hypertension, that is affecting 20-50% of the adult population in developed countries is the most common risk factor than any other, for AF development. More in detail, hypertension increases the risk for AF in men and women by 1.5 fold and 1.4 fold, respectively. Atrial fibrillation and hypertension are two often coexistent, medical conditions (9,10).

The purpose of the present study was to explore patients' characteristics associated with Atrial Fibrillation (AF) having as an underlying cause hypertension.

2. MATERIAL–METHODS

2.1. Study population

The sample of the study consisted of 170 patients with atrial fibrillation having as an underlying cause hypertension who visited hypertension cardiology department of a public General hospital during March 2016 to June 2016. This sample was a convenience one. The study included all patients with atrial fibrillation caused by hypertension. Criteria for inclusion of patients in the study were diagnosis of hypertension and atrial fibrillation.

Data collection was performed by the method of the interview.

Ethical considerations : The study was approved by the the Medical Research Ethics Committee of the hospital where the study was conducted and conformed to the principles outlined in the Declaration of Helsinki (1989) of the World Medical Association. AF patients participated only after they had given their written consent. Data collection guaranteed anonymity and confidentiality.

2.2. Data variables

More in detail, data included: seismographic characteristics (e.g. gender, age, marital status, etc.), clinical characteristics (e.g. AF type, medication, other disease, etc.) and other patients' self reports variables.

2.3. Statistical Analysis

Categorical variables are presented by absolute and relative frequencies (percentages), whereas continuous are presented by median and interquartile range. To test the existence of association between patients' characteristics and the type of atrial fibrillation, Chi-Squared test of independence and Kruskal-Wallis test was performed. In order to estimate the probability of the type of atrial fibrillation, multinomial logistic regression was performed. Results are presented with Odds Ratios and 95% confidence intervals. The level of statistical significance was set to $\alpha=5\%$. The analysis was performed with the statistical package STATA v.13.

2.4. Limitations of the study

The study sample was not representative of all AF patients in Greece but a convenience sample. This method of sampling limits the "generalizability" of results. Moreover, in the present study there was not included another group of AF patients not having as an underlying cause hypertension but some other medical reasons that will permit comparisons between these two different groups.

3. RESULTS

3.1. Characteristics of patients

Regarding type of AF, 21.9% of the patients had paroxys-

	n (%)
Gender (Male)	101 (59.4%)
Age (years)	
30-40	2 (1.2%)
41-50	7 (4.1%)
51-60	14 (8.2%)
61-70	40 (23.5%)
71-80	107 (62.9%)
Marital status	
Married	149 (87.6%)
Single	6 (3.5%)
Divorced/Widowed	15 (8.8%)
Education	
Primary School	25 (14.7%)
High School	79 (46.5%)
University/College	48 (28.2%)
MSc, Phd	18 (10.6%)
Type of atrial fibrillation	
Paroxysmal	37 (21.9%)
Persistent	109 (64.5%)
Permanent	23 (13.6%)
Antihypertensive medication (Yes)	150 (89.8%)
Anticoagulants medication (Yes)	137 (82.0%)
Antiarrhythmic medication (Yes)	128 (76.6%)
Anticoagulants Type	
Sintrom	85 (61.2%)
Noac	54 (38.8%)
Caffeine consumption (Yes)	122 (71.8%)
Alcohol consumption (Yes)	34 (20.0%)
Cigarettes consumption (Yes)	74 (43.5%)
Diabetes (Yes)	39 (22.9%)
Thyroid (Yes)	53 (31.2%)
Sleep apnea (Yes)	56 (32.9%)
Heart failure (Yes)	62 (36.5%)
Controlled blood pressure (Yes)	152 (89.4%)
Years onset of hypertension	
≤1	5 (2.9%)
2-5	63 (37.1%)
6-10	56 (32.9%)
11-15	21 (12.4%)
>15	24 (14.1%)
Years onset of AF	
≤1	28 (16.5%)
2-5	118 (69.4%)
6-10	14 (8.2%)
11-15	6 (3.5%)
>15	4 (2.4%)
INR	
2-3	141 (82.9%)
<2	25 (14.7%)
>3	4 (2.4%)
Previous hospitalization due to AF (Yes)	98 (58.0%)
Informed of their health	
Very	47 (27.6%)
Enough	95 (55.9%)
Little	28 (16.5%)
	Median (IQR)
Weight (kg)	79 (69-90)
Height (cm)	170 (162-175)
BMI	27.76 (24.9-30.95)
Ejection Fraction	65 (60-65)

Table 1. Patients characteristics (N=170)

	Type of atrial fibrillation			p-value
	Paroxysmal	Persistent	Permanent	
	N(%)	N(%)	N(%)	
Gender				0.773
Male	20 (54.1%)	66 (60.6%)	14 (60.9%)	
Female	17 (45.9%)	43 (39.4%)	9 (39.1%)	
Age (years)				0.595
≤70 years	16 (43.2%)	40 (36.7%)	7 (30.4%)	
71-80 years	21 (56.8%)	69 (63.3%)	16 (69.6%)	
Marital Status				0.706
Married	31 (83.8%)	97 (89.0%)	20 (87.0%)	
Single/ Divorced/ Widowed	6 (16.2%)	12 (11.0%)	3 (13.0%)	
Education				0.372
Up to high school	21 (56.8%)	65 (59.6%)	17 (73.9%)	
University/MSc	16 (43.2%)	44 (40.4%)	6 (26.1%)	

Table 2. Association between AF type and patients' basic characteristics (N=170)

mal AF while 64.5% and 13.6% had persistent and permanent AF, respectively.

From Table 1 we observe patients' characteristics.

3.2. Association of the type of atrial fibrillation and patients' characteristics

Tables 2 and 3 show the results of the association between type of AF and patient's characteristics. Regarding the basic patient's characteristics (Table 2), no statistically significant association was observed between the type of AF and characteristics.

Regarding clinical and other characteristics (Table 3), statistically significant association of the type of AF was observed with the medication of anticoagulants ($p=0.008$), the medication of antiarrhythmics ($p=0.024$), whether the blood pressure was controlled ($p=0.052$), with the years from onset of AF ($p<0.001$), the previous hospitalization due to AF ($p=0.036$) and whether they were informed of the state of their health ($p=0.008$).

More specifically, patients who had persistent AF were receiving anticoagulants and antiarrhythmics at a higher percentage (88.8% and 82.2%, respectively) than patients with paroxysmal (69.4% and 72.2%, respectively) or permanent AF (69.6% and 56.5%, respectively). Furthermore, patients with persistent AF had at a lower percentage their blood pressure controlled than patients with paroxysmal or permanent AF (85.3% vs. 97.3% and 95.7%, respectively). Moreover, patients with permanent AF had at a higher percentage >5 years onset of their heart problem (47.8%) than patients with paroxysmal or persistent AF (10.8% and 8.3%, respectively). Patients with permanent AF had at a higher percentage previous hospitalization due to AF (69.6%) than patients with paroxysmal (40.5%) or persistent AF (62%). Lastly, patients with persistent AF were very informed of the state about their health at a higher percentage (33%) than patients with paroxysmal or permanent AF (13.5% and 26.1%, respectively).

3.3. Estimation of type of atrial fibrillation

Multinomial logistic regression was applied in order to estimate the probability of the type of AF that patients had.

	Type of atrial fibrillation			p-value
	Paroxysmal	Persistent	Permanent	
	N(%)	N(%)	N(%)	
Antihypertensive medication				0.259
Yes	30 (83.3%)	99 (92.5%)	20 (87.0%)	
No	6 (16.7%)	8 (7.5%)	3 (13.0%)	
Anticoagulants medication				0.008
Yes	25 (69.4%)	95 (88.8%)	16 (69.6%)	
No	11 (30.6%)	12 (11.2%)	7 (30.4%)	
Antiarrhythmic medication				0.024
Yes	26 (72.2%)	88 (82.2%)	13 (56.5%)	
No	10 (27.8%)	19 (17.8%)	10 (43.5%)	
Anticoagulants Type				0.284
Sintrom	12 (48.0%)	60 (62.5%)	12 (70.6%)	
Noac	13 (52.0%)	36 (37.5%)	5 (29.4%)	
Caffeine consumption				0.439
Yes	28 (75.7%)	79 (72.5%)	14 (60.9%)	
No	9 (24.3%)	30 (27.5%)	9 (39.1%)	
Alcohol consumption				0.132
Yes	7 (18.9%)	18 (16.5%)	8 (34.8%)	
No	30 (81.1%)	91 (83.5%)	15 (65.2%)	
Cigarettes consumption				0.189
Yes	18 (48.6%)	49 (45.0%)	6 (26.1%)	
No	19 (51.4%)	60 (55.0%)	17 (73.9%)	
Diabetes				0.357
Yes	8 (21.6%)	23 (21.1%)	8 (34.8%)	
No	29 (78.4%)	86 (78.9%)	15 (65.2%)	
Thyroid				0.855
Yes	13 (35.1%)	33 (30.3%)	7 (30.4%)	
No	24 (64.9%)	76 (69.7%)	16 (69.6%)	
Sleep apnea				0.564
Yes	14 (37.8%)	33 (30.3%)	9 (39.1%)	
No	23 (62.2%)	76 (69.7%)	14 (60.9%)	
Heart failure				0.095
Yes	8 (21.6%)	44 (40.4%)	10 (43.5%)	
No	29 (78.4%)	65 (59.6%)	13 (56.5%)	
Controlled blood pressure				0.052
Yes	36 (97.3%)	93 (85.3%)	22 (95.7%)	
No	1 (2.7%)	16 (14.7%)	1 (4.3%)	
Years onset of hypertension				0.228
≤5	19 (51.4%)	44 (40.4%)	5 (21.7%)	
6-10	11 (29.7%)	35 (32.1%)	9 (39.1%)	
>10	7 (18.9%)	30 (27.5%)	9 (39.1%)	
Years onset of AF				<0.001
≤1	11 (29.7%)	13 (11.9%)	4 (17.4%)	
2-5	22 (59.5%)	87 (79.8%)	8 (34.8%)	
>5	4 (10.8%)	9 (8.3%)	11 (47.8%)	
Previous hospitalization due to AF				0.036
Yes	15 (40.5%)	67 (62.0%)	16 (69.6%)	
No	22 (59.5%)	41 (38.0%)	7 (30.4%)	
Informed of their health				0.008
Very	5 (13.5%)	36 (33.0%)	6 (26.1%)	
Enough	21 (56.8%)	62 (56.9%)	12 (52.2%)	
Little	11 (29.7%)	11 (10.1%)	5 (21.7%)	

Table 3. Association between AF type and patients' clinical characteristics (N=170)

Factors that were statistically significant associated with the type of AF in the univariate analysis (Table 3) were entered in the model. Table 4 presents these results.

We conclude that, patients receiving anticoagulants medication had 0.34 and 0.18 times lower probability to have paroxysmal and permanent AF respectively than persistent

	OR (95% CI)	p-value
Type: Paroxysmal		
Anticoagulants medication		
Yes	0.34 (0.11-0.96)	0.043
No	Ref. Cat.	
Antiarrhythmic medication		
Yes	0.80 (0.30-2.17)	0.667
No	Ref. Cat.	
Controlled blood pressure		
Yes	7.49 (0.83-67.51)	0.073
No	Ref. Cat.	
Years onset of AF		
≤1	Ref. Cat.	
2-5	0.24 (0.07-0.75)	0.015
>5	0.31 (0.05-1.74)	0.185
Previous hospitalization due to AF		
Yes	0.92 (0.35-2.40)	0.868
No	Ref. Cat.	
Informed of their health		
Very	Ref. Cat.	
Enough	2.11 (0.67-6.57)	0.200
Little	5.73 (1.47-22.4)	0.012
Type: Permanent		
Anticoagulants medication		
Yes	0.18 (0.04-0.69)	0.013
No	Ref. Cat.	
Antiarrhythmic medication		
Yes	0.46 (0.14-1.51)	0.204
No	Ref. Cat.	
Controlled blood pressure		
Yes	5.02 (0.52-48.1)	0.162
No	Ref. Cat.	
Years onset of AF		
≤1	Ref. Cat.	
2-5	0.11 (0.02-0.55)	0.009
>5	1.95 (0.35-10.7)	0.441
Previous hospitalization due to AF		
Yes	5.25 (1.25-21.9)	0.023
No	Ref. Cat.	
Informed of their health		
Very	Ref. Cat.	
Enough	0.41 (0.11-1.57)	0.196
Little	2.92 (0.57-14.9)	0.198

Table 4. Estimation of the type of atrial fibrillation (Reference Type: Persistent)

AF ($p=0.043$ and $p=0.013$, respectively). Moreover, patients with 2-5 years of AF had 0.24 and 0.11 times lower probability to have paroxysmal and permanent AF ($p=0.015$ and $p=0.009$, respectively) than patients with less than 2 years of AF. Patients who were 'little' informed about the state of their health had 5.7 and times higher probability to have paroxysmal AF than persistent ($p=0.012$) than patients who were 'very' informed. Lastly, patients who had been previously hospitalized due to AF had 5.25 times higher probability to have permanent AF ($p=0.023$).

4. DISCUSSION

The present study that explored 170 AF patients showed that 59.4% were men and 62.9% above 70 years. Similarly, Majeed et al., (11) indicated an increased AF prevalence in the age group of 75-84 years old. More specifically, AF is present in 0.12%-0.16% of individuals younger than 49 years, in 3.7%-4.2% of individuals aged 60-70 years, and in 10%-17% aged 80 years or older (6).

Data also revealed that 21.9% of the patients had paroxysmal AF while 64.5% and 13.6% had persistent and permanent AF, respectively. Though, AF had been considered as an entity, nowadays it is clearly classified into different subtypes that are related with patients' clinical profiles, different treatment options and long-term outcomes (6, 12-15).

In Greece, RAFTING study which explored 1.127 Greek patients aged 71±12 years showed that 54% of participants had paroxysmal AF. Furthermore, 68% of the participants had a previous AF history. Regarding cardiovascular risk factors, RAFTING study revealed that 74.4% of participants had arterial hypertension, 24.1% diabetes mellitus and 44.8%, hyperlipidemia while, comorbidity as it was indicated by the medical history, was heart failure and coronary artery disease in 39.9% and 25.6% of participants, respectively (16). The Arcadia Rural Study on Atrial Fibrillation (ARSAF) that was also conducted in Greece and explored 1155 individuals in Arcadia province showed a 3.9% AF prevalence which increased according to age. The researchers also claimed that AF patients failed to receive appropriate antithrombotic treatment (17). Ninios et al., (18) who explored 720 individuals older than 65 years living in rural areas in Greece showed 5% prevalence of permanent AF. One of the crucial issues in AF treatment is to adequately manage comorbidities, thus reducing morbidity and mortality. The most frequent comorbidities are hypertension (67%-76%), heart failure (22%-42%), diabetes (20%-24%) and obesity (20%-35%) (6). In the present study, 36.5% of AF patients had heart failure which is in line with other studies that indicated existence of heart failure in approximately one-half of AF patients (19-22). Vardas et al., (21) illustrated that AF incidence increases progressively with deterioration in NYHA functional class of heart failure. Interestingly, heart failure and AF share common characteristics as they are both diseases of the elderly with hypertension to be their most common risk factor. Acute decompensation of heart failure is the leading cause of hospitalization in the persistent and permanent forms types of AF (12.9% and 13.6%, respectively) (6).

Data also showed that 89.8% of participants received anti-hypertensive medication, 82% anticoagulants and 76.6% antiarrhythmics. The goal of AF treatment is rhythm control in order to avert symptoms and prevent oncoming AF episodes (14,15). Anticoagulant medication should be considered at high risk patients for embolization since embolic stroke is increased 6 fold in patients with chronic AF (23,24). Interestingly, anticoagulation is the treatment choice in chronic AF since it is decreasing the blood's tendency to clot (25,26), thus decreasing the rate of stroke up to 80% (8). Despite effectiveness of anticoagulation, there is a knowledge deficit in non-cardiologists regarding guidelines in AF management (24). Moreover, there is noticed patients' failure to receive stroke prophylaxis according to Deplanque et al., (26) who showed

that in 370 patients with nonvalvular atrial fibrillation, the 257 were according to guidelines eligible for oral anticoagulation, but only 82 (22.2%) had received this medicine. Advanced age was shown by the cardiologists as a potential contraindication for non-prescription of anticoagulation.

Contrary to general expectations, participants did not quit their habits as 20% and 43.5% consumed alcohol and cigarettes, respectively. Similarly, RAFTING study revealed that 13.5% of participants were current smokers and 31.6% were previous smokers (16).

Smoking and alcohol consumption are associated with AF incidence (27-33). Globally, 6.7% of the total risk of AF in men and 1.4% of the risk in women are attributed to smoking (27). Current smoking is seemed to be responsible for more than a 2 fold increased risk of AF (28) and is associated with a higher risk of thromboembolism or death in AF patients (29). Smoking status, predicts long-term adverse outcomes including bleeding events in patients with non valvular AF (30). Heavy alcohol consumption in AF patients is associated with a higher incidence of thromboembolic event or death (31). These findings are underscoring the need for education in adopting a more positive attitude to the disease and modify risk factors (32,33).

Analysis of data revealed that 58% of participants had previous hospitalization due to AF. Amin et al., (34) who explored 8035 AF patients (57.6% males) with mean age 66.1 years, showed that 37.9% of patients had a rehospitalization of whom 25% were readmitted within 30 days of the initial hospitalization. Naccarelli et al., (35) showed that 35.6% of AF patients were hospitalized for non-cardiovascular causes and 27.2% for cardiovascular causes. Patel et al., (36) indicated an increase of AF hospitalizations by 23% from 2000 to 2010, in patients 65 years or older and showed as the most common comorbidities the hypertension (60.0%), diabetes (21.5%) and chronic pulmonary disease (20.0%). Wolowacz et al., (37) in a systematic review which was performed from 1990 to 2009 showed that direct-cost ranged from \$2000 to 14,200 per patient-year in the USA and from €450 to 3000 in Europe. In the USA, AF hospitalizations cost almost \$6.65 billion in 2005. In recognition of this tremendous economic burden on the healthcare it is essential to adopt a close monitoring during follow-up visits and laboratory tests.

In regard to information state, the majority of the sample reported to be 'very' or 'enough' informed about their health. Patients who acquire an adequate level of information, usually report fewer symptoms, perceive greater control over AF and experience less emotional distress. Evidence guidelines to clinicians regarding patients' education or counseling about self-management are essential (37-39). Providing needs-orientated care is a key-element in achieving optimal treatment outcomes. Reinforcement of acquired information during follow-up and assessment of patients' response is necessary (40).

5. CONCLUSIONS

According to the results, patients who had persistent atrial fibrillation received anticoagulants and antiarrhythmics, had at a lower percentage their blood pressure controlled and were very informed about the state of their health. Patients with permanent atrial fibrillation had at a higher percentage >5

years onset of their heart problem and prior hospitalization due to atrial fibrillation. It is important to enhance awareness of factors associated to this frequently-encountered arrhythmia amongst health care professionals when planning clinical management of atrial fibrillation.

Clinically, the present findings may shed more light in understanding which patient-related characteristics are associated with AF caused by hypertension, thus enhancing individualized treatment.

• **Acknowledgements:** We would like to show our gratitude to Manolis J Athanasios, the Director of the Cardiology Department of the Asklepeion Hospital in Athens for sharing his wisdom and his clinical expertise with us during the course of this research.

• **Authors' contributions:** Styliani Koutsaki, Ioannis Koutelekos, Georgia Gerogianni, Georgia Fouka and Maria Polikandrioti designed and performed the research, analyzed the data, and wrote the manuscript. Maria Koutsaki, Aggeliki Koukoulzeli, provided support for data selection. All authors contributed substantially to drafts and revisions of the manuscript. They also approved the current revised version.

• **Conflict of interest:** none declared.

• **Funding:** no specific funding was received for this study.

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