Prevalence and Major Risk Factors for Atrial Fibrillation

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Abstract: This research paper studies prevalence and major risk factors for atrial fibrillation. This problem is very important and significant nowadays in the medicine. People are suffering a lot and is considered one of the major health problems.

Atrial fibrillation (AF) is a heart rhythm disorder that increases the risk of stroke, disability, and mortality. The prevalence of AF in the adult population is on average 0.4–2%. According to the Global Burden of Disease (GBD) Study, about 33.5 million people in the world suffer from AF. The aim of our study was to study the prevalence of AF among the adult population of Almaty and Almaty region and the risk factors for the development of AF. Of the 1,575 respondents, 52 were found to have AF, which was 3.3%. The main risk factors for the development of AF / TP were age, diseases of the cardiovascular system, type 2 diabetes mellitus and overweight.

Keywords: Atrial fibrillation prevalence, risk factors for atrial fibrillation.

INTRODUCTION

Purpose of our study was to study the prevalence of AF among the adult population of Almaty and Almaty Oblast and the risk factors for the development of AF.

Atrial fibrillation (AF) is a heart rhythm disorder that increases the risk of stroke, disability, and mortality. The prevalence of AF among the adult population averages 0.4–2% [1,3]. According to the Global Burden of Disease (GBD) Study, about 33.5 million people in the world suffer from AF [2].

In the developed countries of Europe and the USA, the prevalence of AF is traditionally higher and tends to further increase. In the US, there are about 2.3 million patients with AF, and by 2050 this figure is expected to increase to 5.6 million [3]. In Europe over the past decade, there has been a twofold increase in the prevalence of AF. Currently, about 10 million Europeans suffer from AF, and by 2050, the frequency of AF may reach 14-17 million patients [1]. The prevalence of AF among European Union countries is different: in Italy, Iceland, the frequency of AF is 1.9%, in Germany 2.3%, in England 2.4%, and in Sweden 2.9% [1,4].

The increase in the prevalence of AF in developed countries is associated with an increase in the proportion of the elderly population, the widespread prevalence of cardiovascular diseases among the population, improved diagnostic and treatment options, an increase in the life expectancy of cardiac patients, as well as an increase in the level of awareness of the population regarding the symptoms of AF [2].

The above factors to some extent determine the lower incidence of AF in the countries of Asia, Africa and Latin America. Thus, in China, the prevalence of AF is 0.78% in the general population and 1.83% among people over 60 [5,6]. In Hong Kong, it is 1.3% among people over 60, and in Korea -2.1% among people over 60 years old, in Japan, 0.7–0.9% among people over 30 years old [7-9]. In Latin American countries, the prevalence of AF is on average 1.6%, with the highest number of patients with AF in Argentina, 1.95% and the smallest in Brazil, 1.44% [10]. The low prevalence of AF is also noted among representatives of Africa, both among African Americans in the United States [11] and among African populations. In particular, among persons in the rural population of Ghana over 60 years old, the prevalence of AF was only 0.3%, and in addition, the prevalence of diseases of the cardiovascular system as a whole was noted in this population [12].

The generally recognized risk factors for the development of AF are age, cardiovascular diseases and metabolic syndrome.

MATERIAL AND RESEARCH METHODS

This research was carried out within the framework of the scientific and technical program "Development

and implementation of a modern system of epidemiological monitoring of the main chronic non-communicable diseases" "Research insutitis of cardiology and internal diseases.

Study Design

Analytical, end-to-end, cross-sectional study.

The material for the study were persons aged 18-69 years, living in the city of Almaty and Almaty region.

In this study, risk factor determinations were used in accordance with the STEPS standardized World Health Organization methodology. Due to the fact that the methodology uses a representative sample of the studied population, which allows extrapolating the results to the population as a whole, the data obtained will be used for comparison with data from other regions of the country. The study was approved by the Local Ethical Commission of the Research Institute of Cardiology and Internal Diseases (Protocol No. 22 dated July 31, 2015). We used a representative two-stage stratified cluster sample, which consisted of 30 sample clusters in the region.

The following survey sites were randomly selected in each stratum:

- in the "large city" stratum - Almaty (9 clusters in total)

- in the "small cities" stratum - Talgar (4 clusters)

- in the "auls / village" stratum there are three randomly selected villages: Zhandosovo village, Panfilovo village, Ushkonyr village (8 clusters) Table **2**.

Thus, the total number of surveyed was 1575 people, aged 18 to 69 years old, living in five regions of Almaty region (Almaty, Talgar, Zhandosovo village, Panfilovo village, Ushkonyr village) Table **1**.

Among the respondents, a survey was conducted regarding their chronic non-infectious diseases, including AF. When referring to the OP / TP of these respondents, an ECG registration and analysis of an outpatient card was conducted. The diagnosis of AF was confirmed when there is an OP registered on the electrocardiogram.

All patients underwent venous blood sampling on an empty stomach to determine the lipid profile (HDL, LDL, total cholesterol, triglycerides).

Statistical analysis of the study data was performed with the calculation of the odds ratio (OR) at a 95% confidence interval.

RESULTS

Of the 1,575 respondents, 52 were found to have AF, which was 3.3%. When analyzing the prevalence of AF among the population of the city and village, no differences were found in the data obtained (3.3% and 3.26%, respectively) (Table **2**).

The average age of all respondents was 47 ± 14 years, the average age of patients with AF was 60 ± 11 years. The majority of patients with AF were women (69.9%), which may be to some extent due to the prevalence of women among respondents in general (74.5%). The main demographic indicators are presented in Table **3**. Patients with AF / TP do not significantly differ in terms of their ethnic composition and level of education from the general population:

Table 1: Number of Survey Participants Surveyed by Territory

Almaty city	Talgar	St.Jandosovo	St.Panfilovo	s.Ushkonyr	TOTAL
737	195	199	196	248	1575

Table 2: Prevalence of Patients with AF in Urban and Rural Areas

Settlements	Total number of respondents, n..	The number of patients with AF, n	The prevalence of AF,%
City (Almaty, Talgar)	932	31	3,3
Village (s.Zhandosovo, s.Panfilovo, s.Ushkonyr)	643	21	3,26
Total	1575	52	

Table 3:   **The Main Demographic Indicators of the Respondents**

		All respondents	Patients with AF
Total		1575	52
Average age		47±14 лет	60±11 лет
Women%		74,5	69,2
Nationality (n,%)	Kazakhs	1131 (71,9)	27 (51,9)
	Russians	230 (14,6)	16 (30,8)
	Uzbeks	6 (0,4)	0
	Ukrainians	14 (0,9)	0
	another asian	170 (10,8)	8 (15,4)
	other european	24 (1,5)	1 (1,9)
Level of education (n,%)	higher	465 (29,5)	9 (17,3)
	the average	992 (63)	35 (67,3)
	below the average	118 (7,5)	8 (15,4)

more than 50% of respondents were of Kazakh nationality and more than 60% did not have a higher education.

In our study, no statistically significant association was found between smoking, alcohol use and the prevalence of AF (Table **4**). In the group with AF, 5.8% indicated smoking and 9.6% for alcohol use, in the group without AF, 15.5% of respondents smoked and 7.4% - used alcohol. The low prevalence of smokers among patients with AF may be associated with the implementation of the recommendation of doctors to limit or quit smoking.

As expected, our study found a natural increase in the prevalence of AF depending on age. If in the age group up to 30 years, the prevalence of AF is 0.9%, then in persons older than 60 years, the frequency of AF reaches 9.2% (Table **5**).

In the group with AF / TP, there is a more than twofold increase in the frequency of cardiovascular diseases compared with the group without AF. Common cardiovascular diseases in patients with AF were arterial hypertension (AH) - 82.7%, coronary heart disease (CHD) - 67.3%, chronic heart failure - 38.5%. Among patients with AF / TP, there is also a higher level of previously suffered heart attacks and strokes

Table 4:   **The Dependence of Smoking and Alcohol Consumption on the Incidence of AF**

	Total number of respondents, n (%)	The number of patients without AF, n (%)	The number of patients with AF, n (%)	OR (95%CI)
Smoking	207 (13,1)	204 (15,5)	3 (5,8)	0,4 (0,12-1,28)
Alcohol consumption	110 (7)	105 (7,4)	5 (9,6)	1,43 (0,56- 3,69)

Table 5:   **The Prevalence of AF in Different Age Groups**

Age group	Total number of respondents, n	The number of patients with AF, n	Распространенность ФП, %
18-29 years old	243	1	0,4
30-39 years old	228	2	0,9
40-49 years old	341	6	1,8
50-59 years old	437	13	3
Over 60 years old	326	30	9,2
Total	1575	52	

Table 6:   Prevalence of Major Cardiovascular Diseases among Respondents

	All respondents, n (%)	Without FP, n (%)	With OP, n (%)
Ischemic heart disease	270 (17,1)	235 (15,4)	35 (67,3)
Hypertension	677 (43)	634 (41,6)	43 (82,7)
CHF	111 (7)	91 (5,97)	20 (38,5)
History of myocardial infarction	60 (3,8)	45 (2,95)	15 (28,8)
History of stroke	46 (2,9)	34 (2,2)	12 (23)
Type 2 diabetes	176 (11,2)	162 (10,2)	13 (25)

(28.8% and 23%). The prevalence of type 2 diabetes in the group with AF was two times higher than in the group without AF (10.2% and 25%) (Table **6**).

As a result of the study, an association was found between overweight and the risk of developing AF. Thus, in individuals with a normal BMI, the incidence of AF was -1.7%, with overweight (BMI 25-29.9) - 3.7% (OR 2.19 95% CI: 1.01-4.76). In obesity, an increase in the frequency of AF is observed, depending on the degree of obesity: with grade 1, 4%, grade 2, 5%, grade 3, 8%. Thus, the risk of developing AF is 2.4 times higher in patients with obesity grade 1 (OR 2.4, 95% CI 1.04-5.53) and almost five times higher in patients with grade 3 obesity (OR 5, 02, 95% CI 1.52-

16.65). In addition, there is a statistically insignificant increase in the frequency of AF in the group with underweight, which may be due to a small number of respondents (Table **7**).

Among men in the studied population, with concomitant abdominal obesity (FROM> 94), the risk of developing AF was higher and amounted to 6.3%, whereas with RT <94, the risk of AF was 1%, (OR 5.96, 95% CI: 1, 34-26,57). In women, this difference was statistically insignificant - 1.8% and 3.5% (OR 2.0, 95% CI: 0.77-5.2) (Table **8**).

We have analyzed the relationship between the prevalence of AF and blood lipids. As a result of the

Table 7:   The Prevalence of AF Depending on BMI

BMI	Total number of respondents, n (%)	Number of respondents without AF, n (%)	The number of patients with AF, n (%)	AF frequency, %	OR (95% CI)
<18	26 (1,65)	25 (1,5)	1 (1,9)	3,8	2,2 (0,28-18,4)
18-24,9	575 (36,5)	565 (37)	10 (19,2)	1,7	-
25-29,9	508 (32,3)	489 (32)	19 (36,5)	3,7	2,19 (1,01-4,76)
30-34,9	319 (20,3)	306 (20)	13 (25)	4	2,4 (1,04-5,53)
35-39,3	98 (6,2)	93 (6,1)	5 (9,6)	5	3,04 (1,02-9,09)
≥40	49 (3,1)	45 (3)	4 (7,6)	8	5,02 (1,16-16,652)
Total	1575	1523	52		

Table 8:   The Prevalence of AF Depending on the Presence of Abdominal Obesity

FROM		Total number of respondents, n (%)	Number of respondents without AF, n (%)	The number of patients with AF, n (%)	AF frequency, %	OR (95% CI)
men	<94	179 (44,6)	177 (45,9)	2 (12,5)	1	5,96 (1,34-26,57)
	>94	222 (55,4)	208 (54)	14 (87,5)	6,3	
Total		401	385	16		
women	<80	283 (24,1)	278 (24,4)	5 (13,9)	1,8	2,0 (0,77-5,2)
	>80	891 (75,8)	860 (75,6)	31 (86,1)	3,5	
Total		1174	1138	36		

Table 9:   The Prevalence of AF in Groups with Various Indicators of Blood Lipi

Indicator	Value (µmol / L)	Total number of respondents, n	Number of respondents without FP, n	The number of patients with AF, n	AF frequency, %	OR (95% CI)
OH	<5,2	952	918	34	3,6	0,83 (0,46-1,48)
	>5,2	619	601	18	3	
Tg	<1,82	1218	1179	39	3,2	1,16 (0,61-2,19)
	>1,82	353	340	13	3,7	
LDL	<3,9	1295	1249	46	3,6	0,652 (0,28-1,54)
	>3,9	256	250	6	2,3	
HDL (men)	<1,68	277	266	11	4	0,96 (0,33-2,82)
	>1,68	121	116	5	4,1	
PAP (women)	<1,42	465	450	15	3,2	0,96 (0,33-2,82)
	>1,42	708	687	21	3	

analysis, there was no statistically significant difference in the incidence of AF versus high density lipoproteins (HDL), low density lipoproteins (LDL), triglycerides (TG) and total cholesterol (TC) in the studied population (Table **9**).

DISCUSSION

As a result of our study, the prevalence of AF among the population over the age of 18 was 3.3%, which is more consistent with the data obtained for Europe and slightly higher than among the population of Asian countries [1,2,6-8]. Determine the exact prevalence AF is quite difficult, since approximately 12–25% of cases of AF are asymptomatic [1] and 11–25% of all forms of AF are taken by the paroxysmal form of AF [2,6], and in the case of isolated AF, this indicator is 60% [14].

Many risk factors play a role in the development of AF. One of the most significant non-modifiable risk factors is age [2,4,11]. In all epidemiological studies, there is a regular increase in the prevalence of AF with age. According to the available data, the frequency of occurrence of AF among men over 75-79 years old doubles in comparison with the age group of 65-69 years and more than five times higher than in the group of 55-59 years [2]. Thus, in the age group older than 80 years, the prevalence is 8-17%, which is most likely associated with the development of organic pathological changes in the cardiovascular system at this age [1,3,5,10,13]. In our study, there was also The increase in the prevalence of AF was shown to be proportional to age: in the age group over 60, the prevalence of AF was almost three times higher than

the age group of 50–59 years and more than 9 times higher than in those under 30 years old.

AF is more likely to be affected by men than women, at an approximate ratio of 1.2: 1, but due to a higher life expectancy, women are more numerous among all patients with AF [1]. The reasons for the higher prevalence of AF among men are not well established [2]. In our study there were more women, which is associated with the predominance of women among respondents in general.

AF often occurs on the background of other diseases of the cardiovascular system. Arterial hypertension (AH), heart failure, coronary heart disease (CHD) are the most frequent comorbid diseases, and in a number of publications are considered as risk factors for developing AF. 2,4,11 The frequency of occurrence of AH among patients with AF is 67-76%, the frequency of concomitant IHD is about 14-32%, heart failure is 22-42% [11,15,16]. The effect of these factors can be reduced with effective treatment. Among the patients studied by us there is a high prevalence of cardiovascular diseases. Thus, the prevalence of AH was 82%, CHD 67.3%, CHF 38.5%. In almost a quarter of patients with AF, a history of heart attack or stroke was noted.

The effects of diabetes, obesity and the metabolic syndrome are of particular interest to researchers around the world. Practically in all studies, the association of diabetes mellitus and obesity with the development of AF has been demonstrated [1-3,11]. The incidence of diabetes mellitus among patients with AF is on average 20-24% [1]. The data obtained by us correspond to the world data - diabetes mellitus was noted in 25% of patients with AF.

In a study by Petter K. Nystrom *et al*. As a result of 13-year follow-up, 4232 participants reported a link between obesity (BMI ≥30) and the risk of developing AF (HR 1.87, CI 95%); in the case of overweight (BMI 25-29.9), this relationship is traced only with concomitant metabolic syndrome (HR1.67, CI 95) [17].

In a study by Irene Grundvold *et al*. 7169 patients with newly diagnosed diabetes were examined. All patients were randomized depending on BMI. During the 4.6-year observation period, 287 cases of AF were recorded. It was found that overweight in patients with type 2 diabetes increases the risk of developing AF by 1.9 times, and obesity 2.9 times. In addition, in patients with a subsequent increase in BMI for 18 months of follow-up, the risk of development increased 1.5 times [18].

CONCLUSSION

In our study, the incidence of AF increases from 1.7% in the group with a normal BMI, to 3.7% among respondents with overweight and 3.7% among those with a BMI above 30. With 3 degrees obesity (BMI> 40 a) the frequency of AF reaches 8%. We analyzed the incidence of AF versus concomitant abdominal obesity. As a result, a statistically significant relationship between the incidence of AF and abdominal obesity was found only in the group of men.

In a study by Alvaro Alonso *et al*. The association of elevated triglycerides and low levels of high-density lipoproteins with the incidence of AF, relative to total cholesterol and low-density lipoproteins was not found [19]. Our data did not confirm the relationship of blood lipids with the frequency of AF.

FINDINGS

The prevalence of AF / TP in the population examined by us was 3.3%. The main risk factors for the development of AF / TP were age, diseases of the cardiovascular system, type 2 diabetes mellitus and overweight.

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