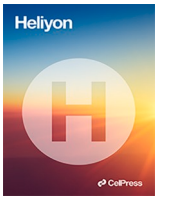
Heliyon 10 (2024) e39788

Contents lists available at ScienceDirect

Heliyon

journal homepage: www.cell.com/heliyon



Research article

Anxiety and depression in patients undergoing catheter ablation due to atrial fibrillation: A cross-sectional survey

Lu Qian, Yan Shen *

Department of Cardiology, First affiliated hospital of Soochow university, Suzhou, 215000, China

ARTICLE INFO

Keywords:
Anxiety
Atrial fibrillation
Care
Depression
Nursing

ABSTRACT

Background: The procedure of catheter ablation is frequently utilized in the treatment of atrial fibrillation, and it is important to note that the mental well-being of patients who are about to undergo this procedure is typically stable. The purpose of this study is to assess the current state and influencing factors of anxiety and depression among patients with atrial fibrillation prior to undergoing catheter ablation, to offer valuable insights to clinical interventions and patient care.
Methods: This study included patients with atrial fibrillation who were treated by radiofrequency ablation in a tertiary hospital in Suzhou, China from February 1 to August 31, 2023. Hospital Anxiety and Depression Scale (HADS) was used to investigate the anxiety and depression in patients with atrial fibrillation. Correlation and multivariate logistic regression analysis were performed to analyze the influencing factors of anxiety and depression.
Results: 164 patients with atrial fibrillation were included. The prevalence of HADS test results indicating the presence of anxiety (HADS-A $\geq$ 8) was 34.15 % (56/164), the presence of depressive symptoms (HADS-D $\geq$ 8) was 25.61 % (42/164). Multivariate logistic regression analysis indicated that per capita monthly household income (OR = 2.96, 95%CI: 2.61–3.48), course of atrial fibrillation (OR = 2.03, 95%CI: 1.87–2.80), the number of episodes of atrial fibrillation in the past month (OR = 1.90, 95%CI: 1.26–2.42), duration of atrial fibrillation attack in the past month (OR = 2.51, 95%CI: 1.99–3.37) were the influencing factors of anxiety (all $P < 0.05$), no statistical effects were found on household income per capita corrected for marital status and household size (all $P > 0.05$). Age (OR = 2.17, 95%CI: 1.67–2.96), course of atrial fibrillation (OR = 1.82, 95%CI: 1.41–2.06), duration of atrial fibrillation attack in the past month (OR = 2.57, 95%CI: 2.06–3.01) were the independent influencing factors of depression (all $P < 0.05$).
Conclusions: The prevalence of anxiety and depression among patients with atrial fibrillation who undergo radiofrequency ablation is high and influenced by patient's income and medical condition. It is imperative for clinical medical professionals to implement targeted psychological interventions that address these contributing factors to reduce the anxiety and depression.

1. Introduction

It has been reported that in the year 2019, there were a recorded 33.31 million individuals affected by atrial fibrillation, resulting in 219.4 thousand deaths attributed to this condition [1]. Furthermore, the burden of atrial fibrillation was substantial, with 65.80

* Corresponding author. First affiliated hospital of Soochow university, 188 Shizi street, Gusu district, Suzhou, Jiangsu province, 215000, China.
E-mail address: hdvd26@sina.com (Y. Shen).

https://doi.org/10.1016/j.heliyon.2024.e39788
Received 21 March 2024; Received in revised form 17 October 2024; Accepted 23 October 2024
Available online 24 October 2024

million disability-adjusted life years reported, reflecting the significant impact of AF on both individual health and public health systems worldwide [2]. Data from epidemiological surveys [3,4] indicate that the standardized prevalence rate of atrial fibrillation among Chinese adults aged 45 and above is approximately 2 %. Some studies [5,6] have shown that the emergence, progression, and outcomes of atrial fibrillation are intricately linked to the emotional and psychological shifts experienced by patients. Characterized by its sudden onset, pronounced symptoms, and propensity for relapse, atrial fibrillation also presents a significant risk for complications and is known for its high recurrence rate [7,8]. When the attack occurs, the heart rhythm is irregular, often accompanied by palpitation, chest tightness and other symptoms, and severe patients may have a sense of near-death [9]. However, some patients indeed experience serious symptoms, but symptom burden varies greatly and some patients are even completely asymptomatic [10]. The influence of atrial fibrillation on patients' capacity to participate in activities is highly variable, with a resultant decrease in outdoor engagements that can intensify their mental and emotional distress. Such circumstances render patients more prone to experiencing anxiety and depression [11,12]. Therefore, the psychological care and management for individuals with atrial fibrillation are of paramount importance.

2. Status quo

Radiofrequency ablation is a common and effective treatment for atrial fibrillation. Studies [13,14] have indicated that patients with atrial fibrillation are found to have a notably higher incidence of anxiety and depression when contrasted with the broader population. The presence of these psychological states does not merely exacerbate the intensity of atrial fibrillation symptoms; it also casts a profound influence on the patients' quality of life and their long-term health outcomes. The interplay between emotional well-being and cardiac health underscores the importance of a holistic approach to treatment, one that addresses not only the physiological aspects of atrial fibrillation but also the psychological factors that can influence its trajectory [15]. Furthermore, the period of waiting for radiofrequency ablation has been linked to increased psychological distress and healthcare costs [16]. By enhancing the understanding of these psychological conditions, healthcare providers are better equipped to customize interventions and support systems that attend to both the physical demands of the procedure and the emotional health of the patients. Adopting a holistic approach is crucial for securing a more favorable prognosis and for ensuring that patients enjoy an enhanced quality of life, liberated from the incapacitating impacts of untreated psychological distress. This comprehensive strategy not only addresses the immediate medical needs but also the long-term psychological well-being.

3. Objective

Deepening the comprehension of anxiety and depressive symptoms is imperative for the enhancement of both the prognostic outcomes and the life quality in patients subjected to radiofrequency ablation for atrial fibrillation. Consequently, this investigation scrutinizes the prevalence and intensity of these psychological conditions in individuals diagnosed with atrial fibrillation on the eve of their radiofrequency ablation. Additionally, it delves into the determinants that may influence these states. The aim is to provide insights that can inform the psychological care and therapeutic approaches for patients with atrial fibrillation, thereby optimizing their clinical management and overall well-being.

4. Methods

4.1. Study design and ethical consideration

This study was a cross-sectional survey design. Cross-sectional surveys are known for their good cost-effectiveness and efficiency, providing a more accurate reflection of the real-world clinical scenarios faced by patients. This study was approved by the ethics committee of First affiliated hospital of Soochow university with approval number: 2,023,034. All enrolled patients provided their informed consent, affirming their voluntary participation in the study. Adhering to the principles of voluntariness, confidentiality, and non-maleficence, we ensured the integrity of the research process. The questionnaire data were meticulously anonymized, with strict confidentiality maintained for all respondent-related private information.

4.2. Study population

The population of this study were patients with atrial fibrillation who were treated by catheter ablation for atrial fibrillation from February 1 to August 31, 2023 in a tertiary hospital in Suzhou, China. The inclusion criteria of patients were as follows: adult patients older than or equal to 18 years old; atrial fibrillation was clearly recorded by electrocardiogram; all the included patients were scheduled for first catheter ablation in our hospital; patients had been well-informed and agreed to participate in this study. The exclusion criteria for patients were as follows: patients with history of mental illness that were taking medicine at the time of admission; patients with cognitive impairment; patients who did not want to participate in this study.

In the context of atrial fibrillation, patients who underwent catheter ablation, the preoperative nursing routine encompassed several key aspects: healthcare providers explained to the patient and their family the objectives, procedures, potential risks, and expected postoperative outcomes of the catheter ablation surgery. We assessed the patient's psychological state and provided necessary psychological support and reassurance. A thorough review of the patient's medical history, including allergies and family history, was conducted to evaluate the risks associated with the surgery. Comprehensive physical examinations were performed,

including assessments of cardiopulmonary function, blood pressure, and heart rate. Essential laboratory tests, electrocardiograms (ECGs), and echocardiograms were conducted to evaluate cardiac structure and function. Medications were adjusted preoperatively according to medical orders, including anticoagulants and antiarrhythmic drugs, with patients being informed of the timing for medication cessation or adjustment. Patients were instructed on preoperative preparation, such as attire and items to bring, and were guided on how to cooperate with the surgery. Pain assessments were made, and corresponding pain management plans were formulated. Family members were educated on how to assist in the patient's postoperative recovery, including daily care and medication management. Patients and their families were ensured to understand emergency response measures and contact information. These nursing routines were designed to ensure that the patient's preoperative physical condition was suitable for surgery, to reduce the risks during and after the surgery, and to facilitate the patient's rapid recovery.

4.3. Survey tools

This study used the following research tools: (1) General data questionnaire. The general demographic data collected in this study included gender, age, educational level, marital status, medical payment method, per capita monthly household income, course of atrial fibrillation, the number of episodes of atrial fibrillation in the past month, duration of atrial fibrillation attack in the past month, European Heart Rhythm Association (EHRA) classification; (2) Hospital Anxiety and Depression Scale (HADS) [17] is a well-established tool in cardiovascular research, renowned for its concise content that is straightforward for patients to comprehend and self-assess. It boasts high reliability and validity, making it an ideal instrument for this study to assess the levels of anxiety and depression among patients with atrial fibrillation. Chinese version of HADS [18] was used in this study. Previous studies [19,20] showed that the sensitivity of the anxiety subscale (HADS-A) was 81.6 %, the specificity was 75.8 %, the positive predictive value (PPV) was 54 %, the negative predictive value (NPV) was 91.9 %. The sensitivity and specificity of the depression subscale (HADS-D) were 80 %, The specificity of HADS-D was 92.9 %, the NPV and PPV were 96.1 % and 52.2 %, respectively. HADS-A and HADS-D each included 7 questions to assess anxiety and depression, each question had 4 options, the score was 0–3, the total score of anxiety and depression was 21. The higher the score, the more severe the symptoms. Referring to previous studies [21,22], this survey took HAD-A $\geq$ 8 and HAD-D $\geq$ 8 as the criteria for the existence of anxiety and depression respectively.

4.4. Survey process

Investigators commenced the clinical research phase only after having undergone a comprehensive training in the application of psychological scales and the acquisition of professional knowledge pertinent to atrial fibrillation. Patient selection was conducted with rigorous adherence to the established inclusion and exclusion criteria. Once a patient's radiofrequency ablation treatment was confirmed, the attending physicians promptly informed the survey researchers to initiate the necessary follow-up procedures. During the radiofrequency ablation procedure, all included patients were administered general anesthesia, and they were fully informed about the sedation process. The operating physician provided a detailed explanation of the procedure to each patient. The questionnaires were administered directly before the commencement of the ablation. To ensure consistency and clarity, a standardized set of instructions was utilized to guide the questionnaire process, with researchers offering prompt clarification to any patient who had inquiries or needed assistance.

4.5. Sample size calculation

Recent study has reported that the prevalence of depression among patients with atrial fibrillation is approximately 27 % [23]. Utilizing this incidence rate, denoted as $p = 0.27$, and setting the significance level at $\alpha = 0.05$, the anticipated margin of error for the study was calculated within the range of the incidence rate, which was $\Delta = 0.27/6 \approx 0.045$. With a two-tailed critical value of $u_{0.05} = 1.96$, the sample size was determined using the following formula [24]: $n = \left(\frac{\mu_\alpha}{\Delta}\right)^2 \times p(1-p)$. The estimated sample size required for the study was calculated to be approximately 140 participants. To account for potential questionnaire loss and invalidation, the sample size was increased by approximately 10 % above this estimate. Consequently, the study should aim to enroll at least 154 patients with atrial fibrillation to ensure robust data collection and analysis.

4.6. Statistical analysis

The data were analyzed by SPSS 23.0 statistical software. Measurement data that followed a normal distribution were presented as the mean $\pm$ standard deviation, with t-tests employed for group comparisons. Categorical data were expressed in terms of frequency and percentage, and group comparisons were conducted using the chi-square (χ^2) test. For the analysis of the relationship between continuous variables, Pearson correlation analysis was utilized, while Spearman correlation analysis was applied to assess the correlation between ranked variables. Initially, all examined parameters were included in a univariate model. Subsequently, parameters with p-values less than 0.1 in the univariate analysis were selected for inclusion in a multivariate model corrected by age and gender, which was used to assess the factors influencing anxiety and depression in patients with atrial fibrillation. In this study, a difference was considered statistically significant when the P-value was less than 0.05.

5. Results

A total of 168 questionnaires were sent out, of which 4 had missing information, this study finally included 164 patients undergoing catheter ablation for atrial fibrillation. As presented in Table 1, Most of the patients were male, the average age of the patients was (65.02 ± 12.88) years old. Most of the patients were over 65 years old, the overall education level of the patients was not high. The average course of atrial fibrillation was (4.66 ± 2.14) years long.

Among the included 164 patients with atrial fibrillation, the prevalence of HADS test results indicating the presence of anxiety (HADS-A ≥ 8) was 34.15 % (56/164), the presence of depressive symptoms (HADS-D ≥ 8) was 25.61 % (42/164). The average HADS-A score of the patients in this study was 5.29 ± 3.06 and the average depression score of HADS-D was 5.18 ± 3.44.

As presented in Table 2, there were statistical differences in the gender, age, educational level, marital status, medical payment method, per capita monthly household income, course of atrial fibrillation, the number of episodes of atrial fibrillation in the past month, duration of atrial fibrillation attack in the past month between patients with anxiety and no anxiety patients (all $P < 0.05$). There were statistical differences in the age, educational level, marital status, course of atrial fibrillation, the number of episodes of atrial fibrillation in the past month, duration of atrial fibrillation attack in the past month between patients with depression and no depression patients (all $P < 0.05$).

The results of correlation analysis on the anxiety and characteristics of patients are shown in Table 3. As indicated in Tabel 4, logistic regression analysis indicated that per capita monthly household income (OR = 2.96, 95%CI: 2.61–3.48), course of atrial fibrillation (OR = 2.03, 95%CI: 1.87–2.80), the number of episodes of atrial fibrillation in the past month (OR = 1.90, 95%CI: 1.26–2.42), duration of atrial fibrillation attack in the past month (OR = 2.51, 95%CI: 1.99–3.37) were the influencing factors of anxiety in patients with atrial fibrillation (all $P < 0.05$). No statistical effects were found on household income per capita corrected for marital status and household size (all $P > 0.05$) (see Table 4).

Table 1
The characteristics of included patients (n = 164).

Characteristics	Cases
Gender	
Male	98 (59.76 %)
Female	66 (40.24 %)
Age	
≥65	105 (64.02 %)
40~65	42 (25.61 %)
18~40	17 (10.37 %)
Educational level	
Junior high school	60 (36.59 %)
Senior high school	69 (42.07 %)
College	35 (21.34 %)
Marital status	
Married	149 (90.85 %)
Widowed	12 (7.32 %)
Other	3 (1.83 %)
Medical payment method	
Medical insurance	155 (94.51 %)
Self-covered	9 (5.49 %)
Per capita monthly household income	
<2000 RMB	45 (27.44 %)
≥2000 RMB	119 (72.56 %)
Course of atrial fibrillation (years)	
<5	126 (76.83 %)
5~10	28 (17.07 %)
>10	10 (6.10 %)
The number of episodes of atrial fibrillation in the past month	
0~3	115 (70.12 %)
4~6	27 (16.46 %)
>6	22 (13.41 %)
Duration of atrial fibrillation attack in the past month	
<1h	18 (10.98 %)
1~6h	32 (19.51 %)
6~24h	26 (15.85 %)
>24h	88 (53.33 %)
EHRA classification	
I	25 (15.15 %)
IIa	32 (19.51 %)
IIb	40 (24.39 %)
III	65 (39.63 %)
IV	2 (1.22 %)

EHRA, European Heart Rhythm Association; RMB: Ren Min Bi. The exchange rate of RMB against the US dollar is about 7.2 per dollar.

Table 2
Univariate analysis of the baseline characteristic of patients with anxiety and depression.

Characteristics	Anxiety patients (n = 56)	No anxiety patients (n = 108)	P	Depression patients (n = 42)	No depression patients (n = 122)	P
Gender			0.103			0.077
Male	25 (44.64 %)	73 (67.59 %)		16 (38.10 %)	82 (67.21 %)	
Female	31 (55.36 %)	35 (32.41 %)		26 (61.90 %)	40 (32.79 %)	
Age			0.035			0.029
≥65	13 (23.21 %)	92 (85.19 %)		21 (50.00 %)	84 (68.85 %)	
40~65	32 (57.14 %)	10 (9.26 %)		14 (33.33 %)	28 (22.95 %)	
18~40	11 (19.64 %)	6 (5.56 %)		7 (16.67 %)	10 (8.20 %)	
Educational level			0.041			0.046
Junior high school	25 (44.64 %)	35 (32.41 %)		24 (57.14 %)	36 (27.51 %)	
Senior high school	21 (37.50 %)	48 (44.44 %)		11 (26.19 %)	58 (47.54 %)	
College	10 (17.86 %)	25 (23.15 %)		7 (16.67 %)	28 (22.95 %)	
Marital status			0.024			0.017
Married	49 (87.50 %)	100 (92.59 %)		33 (78.57 %)	116 (95.09 %)	
Widowed	6 (10.71 %)	6 (5.56 %)		8 (19.05 %)	4 (3.28 %)	
Other	1 (1.79 %)	2 (1.85 %)		1 (2.38 %)	2 (1.63 %)	
Medical payment method			0.113			0.105
Medical insurance	48 (85.71 %)	107 (99.07 %)		34 (80.95 %)	121 (99.18 %)	
Self-covered	8 (14.29 %)	1 (0.93 %)		8 (19.05 %)	1 (0.82 %)	
Per capita monthly household income			0.026			0.102
<2000 RMB	35 (62.50 %)	10 (9.26 %)		20 (47.62 %)	25 (20.49 %)	
≥2000 RMB	21 (37.50 %)	98 (90.74 %)		22 (52.38 %)	97 (79.51 %)	
Course of atrial fibrillation (years)			0.044			0.026
<5	22 (39.29 %)	104 (96.30 %)		15 (25.71 %)	111 (90.98 %)	
5~10	25 (44.64 %)	3 (2.77 %)		20 (47.62 %)	8 (6.56 %)	
>10	9 (16.07 %)	1 (0.93 %)		7 (16.67 %)	3 (2.46 %)	
The number of episodes of atrial fibrillation in the past month			0.018			0.045
0~3	17 (30.36 %)	98 (90.74 %)		3 (7.14 %)	112 (91.80 %)	
4~6	19 (33.93 %)	8 (7.41 %)		20 (47.62 %	7 (5.74 %)	
>6	20 (35.71 %)	2 (1.85 %)		19 (45.24 %)	3 (2.46 %)	
Duration of atrial fibrillation attack in the past month			0.014			0.009
<1h	2 (3.57 %)	16 (14.81 %)		0 (0.00 %)	18 (14.75 %)	
1~6h	5 (8.93 %)	27 (25.00 %)		1 (2.38 %)	31 (25.41 %)	
6~24h	18 (32.14 %)	8 (7.41 %)		17 (40.48 %)	9 (7.38 %)	
>24h	31 (55.36 %)	57 (52.78 %)		24 (57.14 %)	64 (52.46 %)	
EHRA classification			0.058			0.061
I	10 (17.56 %)	15 (13.89 %)		4 (9.52 %)	21 (17.21 %)	
IIa	12 (21.43 %)	20 (18.52 %)		8 (19.05 %)	24 (19.67 %)	
IIb	11 (19.64 %)	29 (26.86 %)		14 (33.33 %)	26 (21.32 %)	
III	23 (41.07 %)	42 (38.89 %)		15 (35.71 %)	50 (40.98 %)	
IV	0 (0.00 %)	2 (1.85 %)		1 (2.38 %)	1 (0.82 %)	

EHRA, European Heart Rhythm Association; RMB: Ren Min Bi.

Table 3
Correlation analysis on the anxiety and characteristics of patients.

Characteristics	r	P
Gender	0.105	0.224
Age	0.211	0.059
Educational level	0.164	0.144
Marital status	0.095	0.158
Medical payment method	0.131	0.277
Per capita monthly household income	0.408	0.032
Course of atrial fibrillation (years)	0.515	0.040
The number of episodes of atrial fibrillation in the past month	0.566	0.012
Duration of atrial fibrillation attack in the past month	0.467	0.014
EHRA classification	0.294	0.089

EHRA, European Heart Rhythm Association.

The results of correlation analysis on the depression and characteristics of patients are shown in Table 5. As shown in Table 6, logistic regression analysis revealed that age (OR = 2.17, 95%CI: 1.67–2.96), course of atrial fibrillation (OR = 1.82, 95%CI: 1.41–2.06), duration of atrial fibrillation attack in the past month (OR = 2.57, 95%CI: 2.06–3.01) were the influencing factors of depression in patients with atrial fibrillation (all $P < 0.05$).

Table 4
Multivariable regression analysis on the influencing factors of anxiety in patients with atrial fibrillation.

Variables	β	SE	OR	95%CI	p
Per capita monthly household income	0.318	0.117	2.96	2.61–3.48	0.018
Course of atrial fibrillation (years)	0.105	0.209	2.03	1.87–2.80	0.021
The number of episodes of atrial fibrillation in the past month	0.127	0.133	1.90	1.26–2.42	0.006
Duration of atrial fibrillation attack in the past month	0.294	0.461	2.51	1.99–3.37	0.031

Table 5
Correlation analysis on the depression and characteristics of patients.

Characteristics	r	P
Gender	0.118	0.093
Age	0.469	0.026
Educational level	0.102	0.094
Marital status	0.188	0.201
Medical payment method	0.128	0.074
Per capita monthly household income	0.286	0.069
Course of atrial fibrillation (years)	0.506	0.036
The number of episodes of atrial fibrillation in the past month	0.206	0.055
Duration of atrial fibrillation attack in the past month	0.561	0.024
EHRA classification	0.404	0.016

EHRA, European Heart Rhythm Association.

Table 6
Multivariable regression analysis on the influencing factors of depression in patients with atrial fibrillation.

Variables	β	SE	OR	95%CI	p
Age	0.156	0.104	2.17	1.67–2.80	0.018
Course of atrial fibrillation (years)	0.105	0.212	1.82	1.41–2.06	0.024
Duration of atrial fibrillation attack in the past month	0.124	0.102	2.57	2.06–3.01	0.017

6. Discussion

Atrial fibrillation is associated with discomfort symptoms such as palpitation, chest tightness and reduced quality of life [25]. Previous studies [26,27] have shown that depression is a risk factor for patients with atrial fibrillation. The results of this study show that the presence of anxiety was 34.15 %, the presence of depressive symptoms was 25.61 %, which is similar to previous reports [28–30]. At present, the mechanism of atrial fibrillation and negative mood is not completely clear, and the two factors may interact with each other. Related studies [31,32] have shown that anxiety and depression can lead to sympathetic hyperactivity, increased catecholamine release and possibility of atrial fibrillation. In addition, anxiety and depression can also increase the level of inflammation in the body, promote atrial electrical remodeling and structural remodeling, increase the risk of atrial fibrillation [33]. Therefore, the anxiety and depression management of patients with atrial fibrillation is of great significance to the prognosis of patients.

In recent years, there has been a growing emphasis on the integrated management approach to atrial fibrillation. This comprehensive evaluation encompasses various aspects such as stroke risk assessment, symptom severity, and the overall burden of atrial fibrillation. Such a multifaceted approach is vital for a thorough understanding of the condition's nuances, thereby empowering patients with the necessary insights to make informed decisions regarding their treatment options [34]. However, in clinical management practice, medical staff tend to pay more attention to the disease itself, while ignoring the patients' own demands and feelings [35]. The findings of this study reveal that several key factors significantly influence the level of anxiety experienced by patients with atrial fibrillation. These include per capita monthly household income, the duration of the atrial fibrillation condition, the frequency of atrial fibrillation episodes within the past month, and the length of atrial fibrillation attacks experienced in the same period. Additionally, the study identifies age, the chronicity of the condition, and the duration of the most recent atrial fibrillation episode as determinants of depressive symptoms in these patients. These insights underscore the multifaceted nature of the impact that both economic and clinical variables have on the mental health of individuals living with atrial fibrillation. Therefore, medical personnel must focus not only on the primary symptoms that patients present but also extend their attention to the psychological state of the patients. Moreover, given the inherent risks associated with interventional procedures, patients often experience significant psychological stress. To address this, healthcare providers can create informative brochures about the disease and related surgical procedures, and establish educational sessions to enhance patient understanding. Additionally, setting up a communication platform can provide a supportive environment for patients to voice their concerns and receive reassurance, thereby helping to alleviate their negative moods and fostering a more positive outlook on their health journey. This multifaceted approach to care ensures that patients are not only physically treated but also emotionally supported throughout their medical experience [36].

Age is significantly related to the occurrence of depression. On the one hand, most of the patients (78.65 %) in this survey are in a state of retirement with age≥60 years old, which may cause a sense of loneliness and uselessness among the elderly [37]. On the other hand, with the increase of age and the influence of disease, the activity ability of the old people decreases, the number of going out to participate in group activities decreases, there is a lack of opportunities for interpersonal interaction, which reduces their social circle and is even ignored by the society [38,39]. This highlights the importance for medical staff in clinical practice to be more vigilant about the psychosocial well-being of elderly patients. It is crucial to enhance psychosocial assessments to promptly recognize the diverse emotional states and psychological needs of patients. By doing so, we can devise targeted interventions that address these specific needs. Such measures are designed to alleviate patients' anxiety and depression and foster an environment conducive to their health and recovery. This proactive approach not only supports the elderly in managing their health conditions more effectively but also contributes to a more holistic and compassionate patient care experience.

It has been found that the severity and frequency of symptoms are positively correlated with the score of anxiety and depression. This is consistent with the findings of previous studies [40,41]. Some studies [42,43] have shown that the escalation of anxiety and depression has been linked to an exacerbation in the severity of atrial fibrillation symptoms. Patients afflicted with atrial fibrillation who also suffer from depression tend to exhibit a higher prevalence of atrial fibrillation symptoms. Furthermore, their risk of complications is significantly elevated, with studies indicating that these individuals face a risk threefold higher than those without depressive symptoms. This highlights the critical need for mental health considerations in the management of atrial fibrillation [44]. The more serious and frequent the symptoms of atrial fibrillation are, the more serious the symptoms of anxiety and depression are [45]. The course of disease is a common influencing factor of emotional disorders, the longer the course of the disease, the more likely the patient is to develop anxiety and depression [46]. Besides, improvement in psychological symptoms of anxiety and depression has been found with catheter ablation, but not medical therapy [47]. Therefore, for patients with atrial fibrillation with anxiety and depression, combined psychotherapy or medical therapy may be beneficial to their recovery, which need further investigations in future studies.

This study has concentrated on patients undergoing catheter ablation, with an emphasis on discerning the factors that contribute to anxiety and depression. However, it is essential to recognize several limitations inherent to this research. Initially, the study's scope is confined to a single-center observational design with a modest sample size, which may engender biases. Furthermore, the criteria for delineating ablation techniques and the taxonomy of atrial fibrillation can exhibit variability across geographies and patient demographics, potentially skewing the observed levels of patient anxiety and depression. Additionally, the study exclusively includes patients earmarked for radiofrequency ablation, which could introduce a selection bias that fails to encapsulate the broader atrial fibrillation patient population. Subsequent studies should aim to augment their methodological robustness by incorporating a control group unaffected by atrial fibrillation. Such a comparative framework would enable a more nuanced understanding of how anxiety and depression manifest in relation to the condition, and their consequential effects on life quality. Moreover, it is critical that future research endeavors develop and assess targeted intervention strategies for atrial fibrillation patients who concurrently grapple with anxiety and depression. The efficacy of these interventions should be rigorously evaluated to ensure they contribute to a more efficacious clinical and psychological support framework for affected individuals.

7. Conclusion

In conclusion, anxiety and depression in patients with atrial fibrillation undergoing radiofrequency ablation was common in the study. For patients undergoing catheter ablation for atrial fibrillation, course of atrial fibrillation, the number of episodes of atrial fibrillation in the past month, duration of atrial fibrillation attack in the past month are the influencing factors of anxiety. Age, course of atrial fibrillation, duration of atrial fibrillation attack in the past month are the influencing factors of depression in undergoing catheter ablation for atrial fibrillation. Considering the identified influencing factors, it is imperative for clinical medical professionals to implement proactive interventions and psychological support strategies. The provision of early and tailored psychological management by the healthcare team is essential to mitigate the anxiety and depression experienced by patients with atrial fibrillation. By addressing these psychological aspects, we can enhance the overall well-being of these patients, potentially improving their treatment outcomes and quality of life.

CRediT authorship contribution statement

Lu Qian: Investigation. **Yan Shen:** Resources, Investigation.

Ethics approval and consent to participate

In this study, all methods were performed in accordance with the relevant guidelines and regulations. The study has been reviewed and approved by the ethics committee of First affiliated hospital of Soochow university (approval number:2,023,034). And written informed consents had been obtained from all the included patients.

Consent for publication

Not applicable.

Availability of data and materials

All data generated or analyzed during this study are included in this published article. The original data will be available from corresponding authors on reasonable request.

Funding

This study did not receive any funding in any form.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2024.e39788.

List of abbreviations

EHRA	European Heart Rhythm Association
HADS	Hospital Anxiety and Depression Scale
PPV	positive predictive value
NPV	negative predictive value
RMB	Ren Min Bi

References

[1] M. Jiao, et al., Estimates of the global, regional, and national burden of atrial fibrillation in older adults from 1990 to 2019: insights from the Global Burden of Disease study 2019, Front. Public Health 11 (2023) 1137230.
[2] H. Li, et al., Global, regional, and national burden of disease study of atrial fibrillation/flutter, 1990-2019: results from a global burden of disease study, 2019, BMC Publ. Health 22 (1) (2022) 2015.
[3] C. Xia, S. Chao, J. Jinjin, Investigation on epidemiological characteristics and antithrombotic therapy of patients with non-valvular atrial fibrillation in Fuling area of Chongqing, China Pharmaceutical Industry 30 (9) (2021) 1–4.
[4] Y. Qi, X. Jin, S. Li, *Investigation on epidemiological characteristics and anticoagulation therapy of atrial fibrillation in community elderly population in Shanghai* Chinese, Clin. Med. 25 (1) (2018) 1–4.
[5] M. Sadlonova, et al., Health-related quality of life, anxiety and depression up to 12 months post-stroke: influence of sex, age, stroke severity and atrial fibrillation - a longitudinal subanalysis of the Find-AF(RANDOMISED) trial, J. Psychosom. Res. 142 (2021) 110353.
[6] M. Polikandrioti, Atrial fibrillation: the impact of anxiety and depression on patients' needs, Psychiatriki 32 (3) (2021) 187–198.
[7] K.A. Bizhanov, et al., Atrial fibrillation: epidemiology, pathophysiology, and clinical complications (literature review), J. Cardiovasc. Electrophysiol. 34 (1) (2023) 153–165.
[8] B. Brundel, et al., Atrial fibrillation, Nat Rev Dis Primers 8 (1) (2022) 21.
[9] A. Alonso, Z. Almuwaqqat, A. Chamberlain, Mortality in atrial fibrillation. Is it changing? Trends Cardiovasc. Med. 31 (8) (2021) 469–473.
[10] J.A. Joglar, et al., ACC/AHA/ACCP/HRS guideline for the diagnosis and management of atrial fibrillation: a report of the American college of cardiology/American heart association joint committee on clinical practice guidelines, Circulation 149 (1) (2023) e1–e156, 2024.
[11] H.V. Bhatt, G.W. Fischer, Atrial fibrillation: pathophysiology and therapeutic options, J. Cardiothorac. Vasc. Anesth. 29 (5) (2015) 1333–1340.
[12] D.P. Morin, et al., The state of the art: atrial fibrillation epidemiology, prevention, and treatment, Mayo Clin. Proc. 91 (12) (2016) 1778–1810.
[13] W. Liu, X. Li, Q. Lin, Analysis of anxiety, depression and syndrome factors in patients with atrial fibrillation before and after radiofrequency ablation, J. Tradit. Chin. Med. 39 (26) (2024) 10–15.
[14] Y. Cheng, J. Wang, Z. Jin, Negative emotion in elderly patients with atrial fibrillation, J. Wuhan Univ. (Nat. Sci. Ed.) 16 (3) (2023) 18–24.
[15] Y. Ai, et al., Atrial fibrillation and depression: a bibliometric analysis from 2001 to 2021, Front Cardiovasc Med 16 (9) (2022) 775329.
[16] J.L. Barclay, et al., Adverse psychological effects and costs associated with waiting for radiofrequency ablation, Pacing Clin. Electrophysiol. 36 (6) (2013) 719–726.
[17] K.L. Smarr, A.L. Keefer, Measures of depression and depressive symptoms: beck depression inventory-II (BDI-II), center for epidemiologic studies depression scale (CES-D), geriatric depression scale (GDS), hospital anxiety and depression scale (HADS), and patient health questionnaire-9 (PHQ-9), Arthritis Care Res. 63 (11) (2011) 454–466.
[18] X. Su, Y. Liu, Y. Cheng, *Reliability and validity of hospital anxiety and depression scale.* Tumor Prevention and treatment 33 (6) (2020) 6–11.
[19] Y. Li, Y. Chu, M. Fan, *Effect of multidisciplinary cooperation mode combined with emotion release therapy on elderly patients with coronary heart disease undergoing PCI* Qilu, J. Nurs. 29 (13) (2023) 5–8.
[20] M. Zhang, X. Jiang, H. Zhen, Effect of nursing intervention based on FOCUS-PDCA procedure on stroke patients with depression, Int. J. Psychiatr. 45 (6) (2018) 4–7.
[21] C. Liu, J. Li, L. Niu, Investigation of anxiety and depression in patients with recurrent tachyarrhythmia undergoing radiofrequency ablation, Chinese Journal of evidence-based Cardiovascular Medicine 7 (3) (2015) 3–5.

[22] X. Zhou, A. Zhang, Z. Ling, Analysis of anxiety and depression and its influencing factors in patients with atrial fibrillation, J. Bengbu Med. Coll. 44 (5) (2019) 5–7.
[23] Y. Tian, S. Li, M. Li, Analysis of anxiety, depression and influencing factors in patients with atrial fibrillation and their families undergoing radiofrequency ablation, Chinese Journal of Modern Nursing 28 (12) (2022) 5–8.
[24] W. Zheng, H. Fan, The method of calculating the sample size of current situation survey, Prev. Med. 32 (6) (2020) 2–6.
[25] U. I, et al., Assessment of frailty and occurrence of anxiety and depression in elderly patients with atrial fibrillation, Clin. Interv. Aging 15 (15) (2020) 1151–1161.
[26] L. Fu, X. Liu, *Effect of anxiety and depression on quality of life in hospitalized patients with atrial fibrillation* Chinese Cardiovascular Research 10 (8) (2012) 561–565.
[27] M. Chen, J. Li, S. Mei, *Psychological nursing intervention analysis of patients with atrial fibrillation during radiofrequency ablation* Journalof practical Clinical Nursing 50 (4) (2017) 2–7.
[28] T. Ts, et al., The effect of anxiety and depression on symptoms attributed to atrial fibrillation, Pacing Clin. Electrophysiol. 37 (4) (2014) 439–446.
[29] Anxiety, et al., Depression, and adverse clinical outcomes in patients with atrial fibrillation starting warfarin: cardiovascular research network WAVE study, J. Am. Heart Assoc. 7 (8) (2018) e007814.
[30] W. P, et al., Depression or anxiety and all-cause mortality in adults with atrial fibrillation–A cohort study in Swedish primary care, Ann. Med. 48 (2) (2016) 59–66.
[31] Y. Li, L. Yuan, Y. Peng, Analysis of preoperative bad mood and influencing factors in patients with atrial fibrillation undergoing radiofrequency ablation, Nursing Care of Integrated traditional Chinese and Western Medicine 9 (2) (2023) 142–144.
[32] J. Lin, Y. Li, W. Xu, Analysis of anxiety and depression and their influencing factors in patients with atrial fibrillation, Journal of Chengdu Medical College 11 (5) (2022) 10–14.
[33] D.M.C.N. Patel, et al., A systematic review of depression and anxiety in patients with atrial fibrillation: the mind-heart link, Cardiovasc Psychiatry Neurol 41 (16) (2013) 159850.
[34] H. J, et al., Risk factors for atrial fibrillation progression, Card Electrophysiol Clin 13 (1) (2021) 201–209.
[35] Y. Ding, et al., Status and influencing factors of "blank period" life control in patients with atrial fibrillation after radiofrequency ablation, J. Nurs. 36 (23) (2021) 4–6.
[36] J. Zhang, Z. Yin, X. Shi, Application of Schram two-way transmission mode and multi-form health education in patients with atrial fibrillation after radiofrequency ablation, Chinese Journal of Naval Medicine 44 (5) (2023) 530–533.
[37] K. Ta, et al., Exploring depressive symptoms and anxiety among patients with atrial fibrillation and/or flutter at the time of cardioversion or ablation, J. Cardiovasc. Nurs. 36 (5) (2021) 470–481.
[38] A. Bf, et al., The influence of depression and anxiety symptoms on health-related quality of life in patients with atrial fibrillation and atrial flutter, J. Cardiovasc. Nurs. 30 (1) (2015) 66–73.
[39] T. Y, et al., Comparison of changes in anxiety and depression level between dabigatran and warfarin use in patients with atrial fibrillation, Clin. Appl. Thromb. Hemost. 23 (2) (2017) 164–167.
[40] X. Zhiying, L. Mei, G. Hongyue, Psychological resilience and influencing factors of patients with atrial fibrillation undergoing radiofrequency ablation, Tianjin Nursing 28 (5) (2020) 5–8.
[41] J. Tang, J. Ding, M. Ao, *Effects of radiofrequency ablation on depression and quality of life in patients with different types of atrial fibrillation.* Chinese Modern Doctor 54 (13) (2016) 4–7.
[42] X. Liu, Investigation of anxiety state and health behavior intervention analysis of patients with atrial fibrillation before radiofrequency ablation, Guangdong Medicine 40 (20) (2019) 4–7.
[43] Y. Zhang, M. Lin, Analysis of anxiety and depression and its influencing factors in patients with cardiovascular disease, Tianjin Nursing 26 (2) (2018) 4–9.
[44] L. L, et al., Differences in quality of life, anxiety and depression in patients with paroxysmal atrial fibrillation and common forms of atrioventricular reentry supraventricular tachycardias, Indian Pacing Electrophysiol J. 14 (5) (2014) 250–257.
[45] F. Yuan, J. Wang, J. Chen, Effect of quality nursing intervention after radiofrequency ablation of atrial fibrillation, Chinese general practice nursing 19 (36) (2021) 4–6.
[46] J.-P. B, et al., The role of sleep disturbance, depression and anxiety in frail patients with AF-gender differences, J. Clin. Med. 10 (1) (2020) 11–16.
[47] A.M. Al-Kaisey, et al., Atrial fibrillation catheter ablation vs medical therapy and psychological distress: a randomized clinical trial, JAMA 330 (10) (2023) 925–933.