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Approaches to panic attack symptoms in cardiology outpatients

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Cardiologists' attitudes towards the patients with panic attack (PA) symptoms can be affected by many variables. This study was aimed to examine the practices and attitudes of cardiologists actively practicing in Turkey through an internet-based survey. An internet-based, cross-sectional, and observational survey was administered to actively practicing adult cardiologists. The sample size was calculated (minimum 135 participants). The survey draft was created by the conductor of the study and the final version of the survey items was decided by psychiatrists and cardiologists. Cronbach's alpha based on standardized items of the survey in the pilot (0.747) and final samples (0.742) was calculated. The survey, which included the characteristics on the landing page, was delivered to participants working in the Turkey via WhatsApp and Yahoo groups. All analyses were performed using IBM SPSS Statistics version 26.0. Ethical approval and informed consent was obtained. One hundred forty-five participants (87 males (60.00%) and 58 females (40.00%); 89 cardiology resident (61.37%) and 56 cardiology specialist (38.63%)) were included in the study. In patients presenting with symptoms of PA, when no cardiac/organic etiology was detected, 83 (57.24%) of the cardiologists directly referred the patients to psychiatry, while 62 (42.76%) of them started the treatment themselves. The most common symptom in patients presenting with non-cardiac PA symptoms was palpitations (86.20%). The number of cardiologists who had experience in starting escitalopram with a preliminary diagnosis of panic disorder (PD) was 50 (31.00%). Forty-three (29.7%) of cardiologists thought that antidepressants (ADs) were addictive. Thirty-five (24.1%) of cardiologists thought that ADs caused forgetfulness. According to 61 cardiologists, ADs should be used in the morning, while according to 64 cardiologists, ADs should be used in the evening. Forty-four (30.3%) cardiologists did not think benzodiazepines were addictive. The number of cardiologists who thought that patients who admitted to any physician other than cardiology with PA symptoms should be routinely referred to cardiology was 71 (49.00%). The difference between PA and PD was not known to any of the participants ($n = 145$). While gender had a limited effect on the findings, it was found that being cardiology specialist or not had a significant relationship with many variables. Binary logistic regression analysis was used to predict approach in the presence of non-cardiac PA symptoms and five variables (specialization status, routine echocardiogram examination, minimum usage time of ADs, association of ADs with addiction, and routine cardiology consultation by a non-cardiologist) were included given their contribution to the model (sensitivity = 86.70%, specificity = 83.90%; Beginning block – 2 Log likelihood 197.961; Block one – 2 Log likelihood 100.083[a], Cox & Snell $R^2 = 0.491$, Nagelkerke $R^2 = 0.659$; Hosmer and Lemeshow Test p value 0.254; constant $p = 0.001$). Non-cardiac PA symptoms are detected in approximately one sixth of those who apply to cardiology outpatient clinics, and it is recommended that cardiologists refer these patients to psychiatry to be evaluated for PD and receive appropriate treatment. PD treatment is a teamwork, and collaboration between cardiology and psychiatry is an integral part of this process.

Keywords Cardiology, Panic disorder, Panic attack, Treatment attitude, Prescription practice, Psychotropic preferences

Abbreviations

PA	Panic attack
PD	Panic disorder

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AD	Antidepressant
CVD	Cardiovascular disease
TCA	Tricyclic antidepressant
TeCA	Tetracyclic antidepressants
SSRI	Selective serotonin reuptake inhibitor
SNRI	Serotonin norepinephrine reuptake inhibitor
BZD	Benzodiazepine

Background

Panic disorder (PD) is defined in both International Classification of Diseases 11th Revision and text revision of Diagnostic and Statistical Manual of Mental Disorders 5th edition text revision as a disorder characterized by recurrent unexpected panic attacks (PA) in which four or more of the symptoms including palpitation, sweating, trembling, sensations of shortness of breath, feeling of choking, chest pain or discomfort, nausea or abdominal distress, feeling dizzy, chills or heat sensations, paresthesias, derealization or depersonalization, fear of losing control or going crazy, and fear of dying occur (Table 1). For PAs to be defined as PD, they must be accompanied by fear and avoidance behaviors of having a new PA for a period of one month[1,2]. Lifetime prevalence of PD among adults is 4.7% and among adolescents is 2.3%. The likelihood of a PD diagnosis is twice as high in females as in males. Typically, PD manifests in late adolescence or early adulthood[3,4]. Although the etiology of PD has not yet been clearly explained, there is increasing evidence indicating the presence of a genetic component. Exposure to an extremely stressful or prolonged event, such as the loss of a loved one or a serious illness or injury, can lead to the development of PD[5].

Some of the diagnostic symptoms of PA are also cardinal features of cardiovascular diseases (CVD)[6,7]. Because of the similarity of somatic symptoms associated with PAs to those of CVDs, PD may often mimic various CVDs and patients often admit or are referred cardiologists[8]. A very recent meta-analysis examining data from 36,687 patients from 93 studies across 31 countries admitting a cardiology outpatient clinic reported that the PD rate among all admissions was 15.3%[9]. These patients undergo cardiac examination with negative results and receive reassurance that their heart is fine. Patients who have just experienced an event that closely resembles acute coronary syndromes often meet this assurance with scepticism. This suspicion results in confirmation of the diagnosis by admitting different cardiologists, an associated increase in health care expenses, and a delay in the patient's access to appropriate treatment[10].

As with all mental disorders, PD is diagnosed based on certain criteria. In the diagnosis process, the patients' current symptoms, the process of the emergence of the symptoms, additional psychiatric and medical symptoms and conditions, and the duration of the symptoms are taken into account. The main features that make up the distinction between PA and PD are questioned in detail (at least one of the PAs has been followed by one month [or more] of one or both of the following: persistent concern or worry about additional PAs or their consequences, a significant maladaptive change in behavior related to the PAs)[1,2]. In order to properly manage the diagnosis, treatment and follow-up processes of PD, specific training is needed for this field. This training is gained directly through psychiatry residency and rotation, but in-service training related to psychiatry can also be used for this purpose[11–13]. Routine training processes in cardiology in Turkey do not include in-service training in psychiatry. Accordingly, it can be expected that the attitudes and practices of cardiologists in general medical conditions are devoid of a psychiatric perspective[14].

Patients with PA symptoms evaluated in the cardiology outpatient clinic began to be investigated many years ago and the subject remains current[8,9]. Despite numerous studies investigating the subject from different aspects, the practices and attitudes of cardiologists towards patients presenting with PA symptoms have not been examined before from a psychiatric perspective. This study aimed to examine the sociodemographic and training characteristics, practices and attitudes regarding PD symptoms, and psychotropic-use characteristics of

An abrupt surge of intense fear or intense discomfort that reaches a peak within minutes and during which time four or more of the following symptoms occur.
Palpitations, pounding heart, or accelerated heart rate
Chest pain or discomfort
Sensations of shortness of breath or smothering
Feeling of choking
Sweating
Chills or heat sensations
Trembling or shaking
Nausea or abdominal distress
Feeling dizzy, unsteady, lightheaded, or faint
Derealization (feelings of unreality) or depersonalization (being detached from oneself)
Fear of losing control or "going crazy"
Fear of dying
Paresthesias (numbness or tingling sensation)

Table 1. Diagnostic symptoms of PA. PA = Panic attack.

cardiologists actively working in Turkey through an internet-based survey. The results of this study may pave the way for organizing in-service training related to PD for cardiologists.

Materials and methods

In this cross-sectional study, an internet-based survey was conducted to cardiology residents and specialists included in WhatsApp and Yahoo groups representative of the cardiologists working actively in Turkey.

Sampling frame and general information

In Turkey, one graduates as a general practitioner after six years of medical faculty education. To become a cardiology specialist, it is necessary to pass the medical specialization exam. Physicians who choose cardiology in the medical specialization exam participate in a five-year residency training period. At the end of this period, the cardiology resident who completed the medical specialization thesis receives the title of cardiology specialist. In Turkey, adult and pediatric cardiology are separate medical specialties. To become a pediatric cardiologist, it is necessary to pass the medical specialty exam, choose the pediatrics department, complete a four-year specialty training, complete a medical specialty thesis, and win the pediatric cardiology subspecialty exam. After three years of pediatric cardiology subspecialty training, the title of pediatric cardiology specialist is obtained.

In this study, the term 'cardiologist' refers to both adult cardiology residents and adult cardiology specialists. The population of this study included all adult cardiologists working actively in Turkey. All adult cardiologists included in this study were medical doctors.

In this study, experiences of cardiologists in managing PA symptoms were inquired. The purpose here is to inquire whether the cardiologist has considered the diagnosis of PD. It is appreciated that it is not possible to determine the accuracy of diagnostic thought and experience retrospectively.

In Turkey, antidepressant (e.g., tricyclic antidepressants (TCA), tetracyclic antidepressants (TeCA), selective serotonin reuptake inhibitors (SSRI), serotonin norepinephrine reuptake inhibitors (SNRI), noradrenaline and specific serotoninergic antidepressants) and benzodiazepine (BZD) medications can be prescribed by cardiologists. Medications with addictive effects such as BZDs are in the green prescription drug class.

Sample size calculation

The number of cardiologists actively working in Turkey is estimated to be 5000. Studies show that all cardiologists frequently encounter patients with symptoms of PA in their outpatient practice. Considering the population proportion as 90%, confidence level as 95% and margin of error as 5%, it was seen that 135 participants were sufficient to carry out this study.

Development of survey

The survey draft was created by the conductor of the study, who has six years of experience in psychiatry practice. All questions had neutral content and leading questions were avoided. There was only one open-ended question questioning the difference/relationship between PA and PD. The survey language was Turkish. While creating the survey, literature, cardiology training in the Turkey, and clinical experiences were taken into consideration. The survey was piloted (Cronbach's alpha based on standardized items = 0.747) and further revised based on feedback from eight cardiologists. The piloted survey was validated by the study authors (one cardiologist, two psychiatrists). The survey, created via Google Form (Alphabet, Googleplex, Mountain View, California, United States)[15], was delivered to participants working in the Turkey via WhatsApp and Yahoo groups. WhatsApp and Yahoo groups, which are thought to have similar ones in every country, were unofficial, but they were the groups in which the majority of cardiologists in Turkey participated. These groups were created by administrators of the country's cardiology association, and joining the group required a reference from an administrator in the group. The conditions to be considered are explained on the survey's landing page. It was emphasized that participants could only fill out the survey once. In case of incorrect filling or multiple responses, the lead author would be contacted via the specified communication channels. In addition, since the institution names of the participants were obtained, it was aimed to prevent multiple responses by comparing the data of participants from the same institution.

The landing page of the survey included the following informations: Definition and characteristics of PA, definition and characteristics of PD, purpose of the study, ethics committee approval data, importance of voluntary, confidentiality, and anonymity principles, focus on personal clinical experiences, requirement to actively work as a cardiologist, not including a psychometric scale, not including questions that may lead to personal sensitivity, survey completion time, abbreviations, the survey will be completed only once, names of researchers, gratitude message to participants, contact information of the study director.

Data collection

An initial e-mail/message and up to four e-mail/message reminders were sent to WhatsApp and Yahoo groups. In this e-mail/message, it was clearly stated that the survey aimed to reach cardiologists actively working in Turkey and examine their approaches to PD symptoms. In order to facilitate the participation of the sample group in the survey, it was emphasized that the estimated completion time of the survey was five minutes. Participants were directed to the Google Form research page by clicking on the "https://" link of this internet-based form. The survey's landing page included information such as the name of the survey, purpose of the study, ethics committee approval information, information that the data will be kept confidential, information that the currently working cardiologists will participate in the study, the survey does not contain questions that may cause personal sensitivity, and average filling time of the survey. Following this information, the question "Do you approve of participating in this study?" was asked, and those who answered "yes" included in the study. Participants were not able to skip items. The survey was open from May 27, 2024 – April 15, 2024.

Many of the responses to the items were related to different themes. Therefore, harmony was not expected between some items. However, there were also items that required harmony and rationality. Therefore, all responses were evaluated separately by two different authors (e.g., harmony between the duration of working in cardiology and specialization status, harmony between the number of daily outpatient admissions and the number of patients with non-cardiac PA symptoms, and harmony between psychotropic preferences). No response without harmony and rationality was detected.

Inclusion and exclusion criteria

Those who were not actively practicing cardiology were not included in the study. There was no age or gender limit. Each response was evaluated on its own. It was planned to exclude discordant respondents from the study. However, it was observed that the participants answered all questions completely. No illogical responses were detected. Therefore, no data were excluded from the study.

Only adult cardiologists were included in the study, and the word cardiologist used anywhere in the text refers to adult cardiologists.

Ethical approval

Ethical approval was obtained from the Firat University Non-invasive Research Ethics Committee and the 1964 Declaration of Helsinki was complied with (Date: 27/09/2023; Number: 2023/13–22). All respondents provided their informed consent for the information provided to be used for research purposes.

Statistical analysis

The internet-based survey was hosted on the Google Forms platform, a secure end-to-end encrypted form builder for free to create online forms that capture classified data[9]. Data was downloaded and stored on Microsoft Excel, an application for managing online surveys and databases. All analyses were performed using IBM SPSS Statistics version 26.0. Descriptive statistics and continuous variables were given as mean ± standard deviation and categorical variables were given as frequency and percentage. The Chi-square test and Fisher's exact test were used to compare the categorical data between the groups and genders. Compliance with normal distribution was determined by the Kolmogorov-Smirnov test and Mann-Whitney U test was used for non-normally distributed variables. Binary logistic regression analysis was used in variable prediction and it was applied separately for each independent variable, and those with significant p values were included in the model. Variables that did not contribute sufficiently to the model were subsequently excluded. The suitability of the independent variable to the model was checked through the Hosmer and Lemeshov test. A p value of less than 0.05 was set as statistical significance.

Almost all items of the survey administered in this study was formative indicators. Since the response options varied, the value of Cronbach's alpha based on standardized items was taken into account. Cronbach's alpha based on standardized items for the entire survey was calculated and found as 0.742 (scale statistics: mean = 143.26; variance = 541.29; standard deviation = 23.26).

Results

Sociodemographic and training characteristics of cardiologists

One hundred forty-five participants (87 males (60.00%) and 58 females (40.00%); 89 resident (61.37%) and 56 specialist (38.63%)) were included in the study. While the mean age ($n = 145$) was 33.33 ± 4.70 years (min 24 years, max 45 years, median 32 years), the mean duration of cardiology practice ($n = 145$) was 4.74 ± 2.57 years (min 1 year, max 12 years, median 5 years).

The distribution of sociodemographic and training characteristics of cardiologists was shown in Tables 2 and 3.

Cardiologists' practices and attitudes towards PA symptoms

During the diagnosis process of patients admitted to the cardiology outpatient clinic with symptoms of PA, all cardiologists routinely examined electrocardiogram, 64 (44.13%) performed echocardiogram, and 98 (67.58%) analysed blood. In patients presenting with symptoms of PA, when no cardiac/organic etiology was detected, 83 (57.24%) of the cardiologists directly referred the patients to psychiatry, while 62 (42.76%) of them started the treatment themselves. In patients presenting with PA symptoms in addition to CVD symptoms, 76 (52.40%) of the cardiologists referred the patients directly to psychiatry, while 69 (47.60%) of them initiated treatment themselves. The most common symptom in patients presenting with PA symptoms and without a cardiac/organic etiology was palpitations, according to 125 (86.20%) cardiologists. The second most common symptom in patients presenting with PA symptoms and without a cardiac/organic etiology was chest pain according to 65 (44.80%) cardiologists and was shortness of breath according to 43 (29.70%) cardiologists.

The number of cardiologists who had experience in starting AD with a preliminary diagnosis of PD was 50 (34.50%). In the treatment with a preliminary diagnosis of PD, the most frequently preferred AD class was SSRI (34.50%). The most frequently preferred SSRI in the presence of PA symptoms was escitalopram (31.00%). The second most preferred SSRI in the presence of PA symptoms was sertraline (19.30%). The most frequently preferred SNRI in the presence of PA symptoms was venlafaxine for three cardiologists (2.06%) and duloxetine for three cardiologists (2.06%). There was no cardiologist with experience in using TCA in the presence of PA symptoms. The most frequently preferred tetracyclic AD in the presence of PA symptoms was mirtazapine (4.10%). Escitalopram (31.70%) and sertraline (2.8%) were the most preferred AD among all ADs in the presence of PA symptoms. Forty-three (29.7%) of cardiologists thought that ADs were addictive. Thirty-five (24.1%) of cardiologists thought that ADs caused forgetfulness. The number of cardiologists who thought that ADs should be taken every day and at the same time if possible was 37 (25.5%). The most common AD side

Variables	Female ($n=58$) mean ± SD (mean rank) & n/n	Male ($n=87$) mean ± SD (mean rank) & n/n	p value
Age (years)	34.05 ± 5.04 (77.87)	32.85 ± 4.42 (69.75)	0.252[a]
Duration of cardiology practice (years)	5.05 ± 3.26 (72.47)	4.53 ± 1.97 (73.35)	0.900[a]
Specialization status (resident/specialist)	31/27	58/29	0.109[b]
Residency training from (university hospital/training and research hospital)	37/21	35/52	0.005*[b]
Current institution (university hospital/training and research hospital)	16/42	36/51	0.090[b]
Average number of cardiology outpatient admission	69.57 ± 10.48 (79.63)	67.53 ± 14.07 (68.58)	0.114[a]
Non-cardiac PA symptom rate in daily outpatient admission (%)	18.97 ± 5.52 (79.14)	18.22 ± 7.31 (68.91)	0.139[a]
Routine echocardiogram examination on admission with non-cardiac PA symptoms (yes/no)	29/29	35/52	0.246[b]
Routine blood analysis on admission with non-cardiac PA symptoms (yes/no)	43/15	55/32	0.169[b]
Patients presenting with non-cardiac PA symptoms (starting treatment oneself/referral to psychiatry)	25/33	37/50	0.945[b]
Patients who already have CVD and present with non-cardiac PA symptoms (starting treatment oneself/referral to psychiatry)	27/31	42/45	0.839[b]
The most common PA symptom in patients presenting with non-cardiac PA symptoms (palpitation/chest pain/shortness of breath)	53/3/2	72/8/7	0.218[c]
The second most common PA symptom in patients presenting with non-cardiac PA symptoms (palpitation/chest pain/ shortness of breath/ feeling dizzy/sweating)	10/21/21/4/2	10/44/22/3/8	0.309[c]
Do you think that patients who present to any physician other than cardiology with PA symptoms should be routinely referred to cardiology? (yes/no)	32/26	39/48	0.222[b]

Table 2. Sociodemographic, training characteristics and experiences, attitudes of cardiologists in terms of gender. *$p < 0.05$; Mann-Whitney U test[a], Chi-square test[b], and Fisher's exact test[c] were used in statistical analysis; SD = Standard deviation, PA = Panic attack, CVD = Cardiovascular disease.

Variables	Resident ($n=89$) mean ± SD (mean rank) & n/n	Specialist ($n=56$) mean ± SD (mean rank) & n/n	p value
Age (years)	32.17 ± 4.79 (60.78)	35.18 ± 3.94 (92.43)	< 0.001*[a]
Duration of cardiology practice (years)	3.31 ± 1.38 (48.24)	7.00 ± 2.39 (112.35)	< 0.001*[a]
Gender (female/male)	31/58	27/29	0.109[b]
Residency training from (university hospital/training and research hospital)	42/47	30/26	0.454[b]
Current institution (university hospital/training and research hospital)	42/47	10/46	< 0.001*[b]
Average number of cardiology outpatient admission	69.55 ± 14.27 (76.43)	66.43 ± 9.71 (67.55)	0.152[a]
Non-cardiac PA symptom rate in daily outpatient admission (%)	19.33 ± 7.27 (77.10)	17.23 ± 5.30 (66.49)	0.064[a]
Routine echocardiogram examination on admission with non-cardiac PA symptoms (yes/no)	17/72	47/9	< 0.001*[b]
Routine blood analysis on admission with non-cardiac PA symptoms (yes/no)	58/31	40/16	0.433[b]
Patients presenting with non-cardiac PA symptoms (starting treatment oneself/referral to psychiatry)	32/57	30/26	0.037*[b]
Patients who already have CVD and present with non-cardiac PA symptoms (starting treatment oneself/referral to psychiatry)	33/56	36/20	0.001*[b]
The most common PA symptom in patients presenting with non-cardiac PA symptoms (palpitation/chest pain/shortness of breath)	75/10/4	50/1/5	0.254[c]
The second most common PA symptom in patients presenting with non-cardiac PA symptoms (palpitation/chest pain/ shortness of breath/ feeling dizzy/sweating)	12/39/25/4/9	8/26/18/3/1	0.355[c]
Do you think that patients who present to any physician other than cardiology with PA symptoms should be routinely referred to cardiology? (yes/no)	29/60	42/14	< 0.001*[b]

Table 3. Sociodemographic, training characteristics and experiences, attitudes of cardiologists in terms of specialization status. *$p < 0.05$; Mann-Whitney U test[a], Chi-square test[b], and Fisher's exact test[c] were used in statistical analysis; SD = Standard deviation, PA = Panic attack, CVD = Cardiovascular disease.

effect experienced by 25 (17.2%) of the cardiologists was weight gain, while 25 (17.2%) experienced sedation. According to 61 cardiologists, ADs should be used in the morning, while according to 64 cardiologists, ADs should be used in the evening. The BZD medication preferred by 71 (49.00%) cardiologists in the presence of PA symptoms was alprazolam. Forty-four (30.3%) cardiologists did not consider BZDs were addictive. Forty-two (30.3%) cardiologists stated that they did not impose any time limit while using BZDs. The most frequently detected electrocardiogram finding in the presence of non-cardiac PA symptoms was sinusal tachycardia for all cardiologists. The number of cardiologists who thought that patients who admitted to any physician other than cardiology with PA symptoms should be routinely referred to cardiology was 71 (49.00%). The difference between PA and PD was not known to any of the participants ($n=145$).

Variables	Female ($n=58$) n/n	Male ($n=87$) n/n	p value
Experience of starting AD with a preliminary diagnosis of PD (yes/no)	25/33	25/62	0.075[a]
The most preferred AD class in treatment with a preliminary diagnosis of PD (no experience/SSRI)	33/25	62/25	0.075[a]
The most commonly preferred SSRI in the presence of PA symptoms (no experience/escitalopram/sertraline)	33/21/4	62/24/1	0.055[b]
The second most preferred SSRI in the presence of PA symptoms (no experience/escitalopram/sertraline/fluoxetine)	33/3/5/17	62/1/22/2	<0.001*[b]
The most frequently preferred SNRI in the presence of PA symptoms (no experience/duloxetine/venlafaxine)	55/2/1	84/1/2	0.683[b]
The most frequently preferred TeCA in the presence of PA symptoms (no experience/mirtazapine)	56/2	83/4	0.544[b]
How long ADs should be used in the presence of PA symptoms? (I stop AD when the symptoms of PA disappear/1 month/3 month/6 month/ 9 month/ 12 month)	16/8/3/8/12/11	27/11/16/15/10/8	0.089[a]
Are ADs addictive? (yes/no)	15/43	28/59	0.414[a]
Do ADs cause forgetfulness? (yes/no)	18/40	17/70	0.113[a]
Did you know that ADs must be used regularly every day for full effectiveness? (yes/no)	17/41	20/67	0.392[a]
Most common AD side effect experience (no experience/weight gain/sedation)	33/14/11	62/11/14	0.140[a]
Which AD is most associated with weight gain in your experience? (no experience/escitalopram/sertraline/paroxetine)	33/1/21/3	62/3/18/4	0.055[b]
Which AD is least associated with weight gain in your experience? (no experience/escitalopram/sertraline/fluoxetine)	33/12/1/12	62/22/3/0	<0.001*[a]
What time of day should ADs be used? (morning/evening/before going to sleep)	19/32/7	42/32/13	0.088[a]
BZD preferred in the presence of PA symptoms (no experience/alprazolam/diazepam/medazepam)	9/24/19/6	15/47/20/5	0.334[a]
Are BZDs addictive? (yes/no)	42/16	59/28	0.555[a]
Time limit for BZD use (no experience/no time limit/maximum 2 week/maximum 1 month/maximum 3 month)	9/16/5/23/5	15/26/14/20/12	0.226[a]

Table 4. Psychotropic use characteristics and attitudes of cardiologists in terms of gender. *$p<0.05$; Chi-square test[a] and Fisher's exact test[b] were used in statistical analysis; SD = Standard deviation, AD = Antidepressant, PD = Panic disorder, SSRI = Selective serotonin reuptake inhibitor, PA = Panic attack, SNRI = Serotonin norepinephrine reuptake inhibitor, TeCA = Tetracyclic antidepressant, BZD = Benzodiazepine.

Variables	Resident ($n=89$) n/n	Specialist ($n=56$) n/n	p value
Experience of starting AD with a preliminary diagnosis of PD (yes/no)	24/65	26/30	0.016*[a]
The most preferred AD class in treatment with a preliminary diagnosis of PD (no experience/SSRI)	65/24	30/26	0.016*[a]
The most commonly preferred SSRI in the presence of PA symptoms (no experience/escitalopram/sertraline)	65/23/1	30/22/4	0.019*[b]
The second most preferred SSRI in the presence of PA symptoms (no experience/escitalopram/sertraline/fluoxetine)	65/1/20/3	30/3/7/16	<0.001*[b]
The most frequently preferred SNRI in the presence of PA symptoms (no experience/duloxetine/venlafaxine)	87/1/1	52/2/2	0.165[b]
The most frequently preferred TeCA in the presence of PA symptoms (no experience/mirtazapine)	85/4	54/2	0.573[b]
How long ADs should be used in the presence of PA symptoms? (I stop AD when the symptoms of PA disappear/1 month/3 month/6 month/ 9 month/ 12 month)	29/16/11/10/13/10	14/3/8/13/9/9	0.121[a]
Are ADs addictive? (yes/no)	32/57	11/45	0.036*[a]
Do ADs cause forgetfulness? (yes/no)	27/62	8/48	0.028*[a]
Did you know that ADs must be used regularly every day for full effectiveness? (yes/no)	23/66	14/42	0.910[a]
Most common AD side effect experience (no experience/weight gain/sedation)	65/10/14	30/15/11	0.029*[a]
Which AD is most associated with weight gain in your experience? (no experience/escitalopram/sertraline/paroxetine)	65/2/16/6	30/2/23/1	0.019*[b]
Which AD is least associated with weight gain in your experience? (no experience/escitalopram/sertraline/fluoxetine)	65/21/2/1	30/13/2/11	<0.001*[b]
What time of day should ADs be used? (morning/evening/before going to sleep)	40/39/10	21/25/10	0.461[a]
BZD preferred in the presence of PA symptoms (no experience/alprazolam/diazepam/medazepam)	15/46/19/9	9/25/20/2	0.176[a]
Are BZDs addictive? (yes/no)	61/28	40/16	0.713[a]
Time limit for BZD use (no experience/no time limit/maximum 2 week/maximum 1 month/maximum 3 month)	15/26/13/23/12	9/16/6/20/5	0.708[a]

Table 5. Psychotropic use characteristics and attitudes of cardiologists in terms of gender. *$p<0.05$; Chi-square test[a] and Fisher's exact test[b] were used in statistical analysis; SD = Standard deviation, AD = Antidepressant, PD = Panic disorder, SSRI = Selective serotonin reuptake inhibitor, PA = Panic attack, SNRI = Serotonin norepinephrine reuptake inhibitor, TeCA = Tetracyclic antidepressant, BZD = Benzodiazepine.

Cardiologists' attitudes and experiences in the presence of PA symptoms were compared by gender in Table 4 and by specialty status in Table 5.

Various variables were compared between cardiologists who initiated PA treatment themselves in the presence of non-cardiac PA symptoms and cardiologists who referred them directly to psychiatry. While age (p = 0.130), average number of cardiology outpatient admission (p = 0.412), non-cardiac PA symptom rate in daily outpatient admission (p = 0.581), routine blood analysis (p = 0.068), and time of use of ADs during the day (p = 0.116)

were similar between groups, duration of cardiology practice (p = 0.021) was higher in the group that started the treatment itself. The routine echocardiogram examination rate of cardiologists who initiated treatment for PA symptoms in the presence of non-cardiac PA symptoms was significantly higher than the group referring to psychiatry (p < 0.001). In the presence of PA symptoms, the minimum duration of AD use was queried to all participants and 37 (44.60%) of those who answered 'I would refer them directly to psychiatry' stated that they thought ADs should be discontinued immediately when PA symptoms disappear ($p < 0.001$). While 61 (98.40%) of those who initiated treatment themselves in the presence of PA symptoms thought that ADs did not cause addiction, 42 (50.60%) of those who referred them to psychiatry thought that ADs caused addiction ($p < 0.001$). While 62 (100.00%) of those who initiated treatment themselves in the presence of PA symptoms thought that ADs did not cause forgetfulness, 35 (42.20%) of those who referred them to psychiatry thought that ADs caused forgetfulness ($p < 0.001$). Seventy-eight (94.00%) of those who referred patients to psychiatry in the presence of PA symptoms did not think that ADs should be taken at the same time every day ($p < 0.001$). While 32 (38.60%) of those who referred patients to psychiatry in the presence of PA symptoms thought that patients with PA referred to branches other than cardiology should be routinely referred to cardiology, this rate was 62.90% among those who treated PA symptoms themselves ($p = 0.004$).

Application of binary logistic regression analysis to various variables

Binary logistic regression analysis was used to predict specialization status and was applied separately for each significant independent variable. According to the binary logistic regression analysis, the p values of routine echocardiogram examination, routine cardiology consultation by a non-cardiologist, approach in the presence of non-cardiac PA symptoms in addition to CVD, and association of ADs with addiction and forgetfulness were determined to be less than 0.05. Only three variables (routine echocardiogram examination, routine cardiology consultation by a non-cardiologist, and approach in the presence of non-cardiac PA symptoms in addition to CVD) were included given their contribution to the model. According to the regression model, the sensitivity of our model was 76.80% and the specificity was 86.50% (Beginning block − 2 Log likelihood 193.438, overall p value < 0.001; Block one − 2 Log likelihood 124.362[a], Cox & Snell $R^2 = 0.379$, Nagelkerke $R^2 = 0.514$; Hosmer and Lemeshow Test p value 0.143; constant $p = 0.018$).

Binary logistic regression analysis was used to predict approach in the presence of non-cardiac PA symptoms. Specialization status, routine echocardiogram examination, minimum usage time of ADs, association of ADs with addiction, and routine cardiology consultation by a non-cardiologist were included given their contribution to the model. According to the regression model, the sensitivity of our model was 86.70% and the specificity was 83.90% (Beginning block − 2 Log likelihood 197.961, overall p value < 0.001; Block one − 2 Log likelihood 100.083[a], Cox & Snell $R^2 = 0.491$, Nagelkerke $R^2 = 0.659$; Hosmer and Lemeshow Test p value 0.254; constant $p = 0.001$).

Discussion

This study examined the attitudes and experiences of cardiology residents and specialists in Turkey regarding PA symptom management. Variables were compared according to gender, specialty status, and approach to the presence of PA symptoms. While gender had a limited effect on the findings, it was found that being cardiology specialist or not had a significant relationship with many variables. In this study, the rate of patients with non-cardiac PA symptoms in the cardiology outpatient clinic was found to be 18.52%. Storer et al.[9] reported this rate as 15.30% in their meta-analysis, which included 36,687 patients, and the finding of this presented study appears to be compatible with the literature.

Physicians working in an interdisciplinary area use psychopathology descriptors to formulate diagnoses, evaluate therapy response, and communicate about patient care. It is not clear whether physicians in the same specialty assign similar meanings to technical terms or whether they effectively communicate these meanings to each other. Considering that medical terminology is not compatible even within the same specialty, non-psychiatric disciplines are not expected to master psychiatric terminology[16,17]. One of the most important questions in this study, what is the difference between PA and PD, was not answered correctly by any of the cardiologists. The fact that even this basic terminological information is not fully understood by cardiologists highlights the importance of in service training on psychiatry.

The findings of this study revealed that the knowledge of cardiologists about psychotropic medications is not at the desired level. It was seen that cardiologists have erroneous information that ADs cause forgetfulness and addiction. Misinformation about psychiatric issues has been shown to be common not only among cardiologists but also among other non-psychiatric physicians[18]. In the study conducted by Örüm[18] on primary care providers, it was reported that the participants' misinformation about ADs (59.03% thought ADs caused forgetfulness, 47.79% thought ADs caused numbness, 17.84% thought ADs caused addiction, 5.50% thought ADs caused suicide phenomenon) was at a considerable level. According to the same study[18], 11.67% of primary care providers did not know that ADs must be taken regularly and at the same time each day to achieve full effectiveness.

Since the types of AD experienced are limited, findings that are not compatible with the literature have been detected regarding the possible side effects of ADs. The AD thought to be most associated with weight gain was determined to be sertraline, and the AD thought to be least associated was escitalopram. However, it has been shown that paroxetine poses a high risk of drug-induced weight gain, while escitalopram and sertraline pose a medium risk. The lack of experience of cardiologists in using paroxetine may explain the current findings[19]. It has been determined that the attitudes of cardiologists regarding the optimum duration of use of ADs vary significantly. As in all medical diseases, duration of medication use is important in PD treatment and guidelines may be needed. On the other hand, antidepressants may have some possible effects that can be confused with PA symptoms such as nausea, headache, tremors, agitation, dizziness, and sweating[20]. These side effects should

be questioned and differential diagnosis should be made in a patient who has started treatment. Some side effects of AD, such as sexual dysfunction and constipation, may disrupt patients' compliance and result in them remaining untreated[20]. In addition, ADs should be started at low doses and gradually increased towards the effective dose[21]. It has been determined that there are significant differences between cardiologists' BZD usage characteristics and experiences. Although it is clearly known that BZDs cause addiction[22], it was observed that there were participants who did not have sufficient knowledge about this feature of BZDs. Additionally, many authorities limit the duration of use of BZDs due to their potential to cause addiction[23]. In contrast, it has been determined that BZD usage periods also vary between cardiologists. The findings of this study regarding psychotropic medications highlight the need for training of cardiologists on this subject.

Patients who admit to the cardiology outpatient clinic with symptoms of PA are diagnosed after various examinations. Electrocardiogram is one of the most commonly used ones. In this study, it was determined that electrocardiogram was obtained from all patients who admitted to cardiology outpatient clinic with symptoms of PA. The fact that electrocardiogram is one of the simplest and fastest tests used to evaluate the heart may be the reason for its frequent use[24]. It seems that echocardiogram is preferred more frequently by specialists in the presence of PA symptoms. The possible reason for this may be that the residents do not have sufficient knowledge and experience in the application and interpretation of echocardiogram. It has been found that blood analysis, including hemogram and biochemical examinations, is also frequently preferred, and this preference does not differ significantly between genders and specialty status. Cardiologists' examinations such as echocardiogram and blood analysis in the presence of PA symptoms did not vary between genders. It has been shown that the most common non-cardiac PA symptom for both males and females, and for both specialists and residents, is palpitations. Other common non-cardiac PA symptoms have been determined to be chest pain and shortness of breath. These findings have been shown to be compatible with the literature[25]. Since this study was conducted in a cardiology outpatient clinic, it is also possible that cardiorespiratory system symptoms such as palpitations, shortness of breath and chest pain were detected at higher rates than normal. It is possible that symptoms such as nausea and vomiting, which are among the symptoms of PA, are detected more frequently in the gastroenterology outpatient clinics[26].

One of the most striking findings of this study is the approach of cardiologists in the presence of non-cardiac PA symptoms. It was observed that a significant portion of cardiologists (42.76%) did not refer patients to psychiatry even though they were unaware of the relationship between PA and PD in the presence of non-cardiac PA symptoms. It was determined that patients with PA symptoms in addition to any CVD were referred to psychiatry less frequently than patients with pure non-cardiac PA symptoms. It has been observed that specialists have a higher rate of initiating treatment for non-cardiac PA symptoms. It has been determined that cardiologists who initiate treatment for the symptoms of PA do not have sufficient knowledge about AD and BZD medications.

34% of cardiologists had experience managing patients with AD in the presence of non-cardiac PA symptoms. Although there is no difference between genders, it has been determined that specialists have more experience in this field. All cardiologists who had experience in starting AD with a preliminary diagnosis of PD reported that their first preferred AD class was SSRIs. While eescitalopram was the most frequently preferred SSRI by cardiologists in the treatment of PA symptoms, sertraline and fluoxetine were found to be the second most preferred ones. While the use of SNRIs and TeCAs by cardiologists in the presence of PA symptoms is quite limited, no cardiologists have used TCAs. A systematic analysis by Du et al.[27] including 5853 patients diagnosed with PD in 42 trials demonstrated that escitalopram was significantly more efficacious and better tolerated than the placebo, which was consistent with the current recommendation[28]. Paroxetine, sertraline, and fluoxetine were significantly more efficacious than the placebo[27]. SSRIs presumably share the same mechanism by which they inhibit the reuptake of serotonin in the presynaptic membrane and increase the concentration of serotonin in the synaptic cleft, while they differ with regard to their pharmacological profiles and clinical therapeutic advantages[29]. It has been widely acknowledged in multiple guidelines that SSRIs should be the first-line treatment options for PD due to their definite therapeutic effects and favourable safety profiles[30]. In the study of Du et al.[27], it was determined that the effectiveness of venlafaxine was higher among SNRI medications. It has been shown that the use of paroxetine, one of the frequently used drugs in the treatment of PD[21], is not common among cardiologists, while the use of fluoxetine is more common among female cardiologists. A possible reason for the widespread use of fluoxetine among females is that its effectiveness in premenstrual dysphoric disorder is better known by female cardiologists[31]. This information shows that cardiologists' preferences for AD use show similar characteristics to the literature[27,30]. However, it was observed that the level of knowledge about ADs was not sufficient. Managing the treatment process is as important as starting the treatment of any medical disease. It is thought that the limited number of AD experiences and inaccurate information about these limited AD preferences will have a negative impact on the treatment process.

PA symptoms can occur physiologically in healthy individuals under various conditions (e.g., a brisk walk or a run). These symptoms occur as a result of sympathetic nervous system activation and are not interpreted as PA by either health professionals or the individuals themselves[32]. In addition, in many medical conditions, sympathetic nervous system activation symptoms can be observed as a reflection of the condition/disease. For example, symptoms such as numbness and tingling are observed in an individual with neuropathic pain due to diabetes mellitus[33]. Some of the sympathetic nervous system activation symptoms can be seen in intoxication or withdrawal states of alcohol[34] and substance use disorders[35]. It is known that the symptoms of sympathetic nervous system activation overlap with the symptoms of elderly individuals resulting from various organic diseases[36]. In order to call the symptoms of sympathetic nervous system activation PA, four or more of the symptoms listed in Table 1 must be present, the PA symptoms must occur spontaneously/suddenly and must be recurrent[1,2]. All clinicians, including cardiologists, should be familiar with these characteristics of PA, which will prevent many detailed examinations and ensure that individuals with PA are directed correctly. On the other

hand, another important point is the difference between PA and PD. PA occurring after sudden and unexpected events is not directly evaluated as pathological. For example, PA can be experienced by almost everyone in situations such as a traffic accident, loss of loved one, or an earthquake. PA that has not turned into PD may not require detailed interventions. PA turning into PD can be prevented with more focused guidance and brief psychoeducation. PD is a process that requires more detailed interventions. Clinicians knowing the distinction between PA and PD can help them reach a conclusion more quickly. The most important tools that clinicians can use to make this distinction are the DSM[1] and ICD[2]. In addition, it may be useful for non-psychiatric clinicians to monitor the severity of the disorder with various psychometric tools in patients who will be followed up with a PD diagnosis[37].

The PD treatment process is a very dynamic and interactive process. PD treatment is a process that requires psychotherapy in addition to medication[38]. Cognitive behavioral therapy is a psychotherapy method that explains human behavior and mental disorders from a cognitive and behavioral perspective and uses these techniques in its therapy. In cognitive behavioral therapy of PD, cognitive restructuring, relaxation exercises and exposure practices are used together with psychopharmacological treatment, and the best results are achieved in this way[39]. In the presence of PA symptoms, trying to treat PD using only psychotropic drugs without referring them to psychiatry may not be sufficient.

Although this study examined the approach of cardiologists in Turkey to PA symptoms, there are problems arising from lack or inadequacy of training in many countries[40,41]. It is assumed that the findings of this study can be interpreted within a broader framework, taking into account the differences in the sociocultural and healthcare systems of various countries. Based on the findings of this study, the approaches and experiences of cardiologists in various countries regarding PD can be compared. Health care professionals need to work in collaboration in order to maintain standardized and internationally valid training based on these and similar studies. While the organization of a country's healthcare system will differ according to the geography, healthcare priorities, availability of resources, and funding, many authorities have recognised the importance of collaboration between psychiatry and general medical branches including internal medicine, cardiology, pulmonology, primary care to enable primary care to deliver effective mental health care.

Strengths, limitations, and future directions

The most conspicuous aspect of this study is that it examines in detail the attitudes and practices of cardiology residents and specialists regarding PA symptoms. The cross-sectional nature of the study can be considered a limitation. Cardiologist experiences with PA symptoms were self-reported, and it was not possible to determine whether the information reported by cardiologists was correct. Their experience in diagnosing mental disorders was not verified by another healthcare professional. In this sense, prospective studies are needed. The position of sociodemographic characteristics, clinical experiences, perspectives on such survey studies, and willingness to participate in surveys of the participants who filled out the surveys distributed to WhatsApp and Yahoo groups are not known within the cardiologist universe in Turkey, that similar limitations may also be encountered in face-to-face survey studies. Although various precautions were taken to distinguish and exclude multiple and incorrect responses, they may not have been completely eliminated. This study includes only adult cardiologists working in Turkey. So, it is not appropriate to generalize the results. The survey was distributed to cardiologists in Yahoo and WhatsApp groups, which may introduce sampling bias as not all cardiologists may be part of these groups. The existence of a non-responder bias is possible. It is not known how often and to what extent cardiologists use applications such as Yahoo and WhatsApp. Also, it is not known which characteristics of cardiologists use these applications and show interest in online surveys. Participation in the survey was voluntary, leading to potential self-selection bias as cardiologists who chose to participate may have different perspectives than those who did not.

Conclusion

Non-cardiac PA symptoms are detected in approximately one-sixth of the admittions to cardiology outpatient clinics. Non-cardiac PA symptoms that persist for more than a month, accompanied by fear of other PAs and avoidance behaviors, indicate PD. Having a PA may not be a clear indication of a mental disorder. Additionally, PAs are frequently encountered in other anxiety disorders other than PD. In the presence of PA symptoms, differential diagnosis is important. The best results are achieved when psychopharmacological treatment is used together with psychotherapy in the treatment of PD. In psychopharmacological treatment, many important decisions need to be made, such as medication selection, possible medication combinations, duration of medication use, and combating possible side effects. Although psychiatrists have the most important role in conducting PD treatment in Turkey, it should not be forgotten that PD treatment is based on collaboration. It is known that somatic symptoms are more common in PA and patients primarily seek treatment from branches other than psychiatry for the treatment of these symptoms. It is recommended that non-psychiatric clinicians refer patients to psychiatry in the presence of non-cardiac PA symptoms. However, the findings of this study show that patients presenting with PA symptoms may encounter some problems in the diagnosis, treatment and follow-up processes. It is possible that the current findings are due to the high workload of cardiologists in Turkey and their lack of in-service training on psychiatry, specifically PAs.

Data availability

The data presented in this study are available on request from the corresponding author.

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Author contributions

DO and SA designed this study. DO and SA collected and processed the data. DO, SA and YK analyzed and

interpreted the data. DO and YK prepared the manuscript. All authors have read and approved the final manuscript.

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Declarations

Competing interests
The authors declare no competing interests.

Ethics approval and consent to participate
This study was designed according to the principles outlined in the Declaration of Helsinki. It was approved by the Ethics Committee of the Firat University. All respondents provided their informed consent for the information provided to be used for research purposes (Date: 27/09/2023; Number: 2023/13–22).

Consent for publication
Approved by all authors.

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