

# Anxiety, depressive, and somatoform disorders in children and adolescents referred to paediatric cardiology with somatic symptoms

## Original Article

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### Abstract

**Introduction:** Chest pain, palpitations, and syncope are among the most common referrals to paediatric cardiology. These symptoms generally have a non-cardiac aetiology in children and adolescents. The aim of this study was to investigate the rate of common psychiatric disorders in children and adolescents referred to the paediatric cardiology clinic with chest pain, palpitations, and syncope and the relationship between cardiological symptoms and psychiatric disorders. **Methods:** Children and adolescents aged 8–16 years who presented at the paediatric cardiology clinic with primary complaints of chest pain, palpitation, or syncope were included in the study. After a detailed cardiology examination, psychiatric disorders were assessed using the DSM IV-TR diagnostic criteria and a semi-structured interview scale (KSADS-PL). The Child Depression Inventory and Spielberger's State-Trait Anxiety Inventory for Children were also applied to assess the severity of anxiety and depression. **Results:** The study participants comprised 73 (68.90%) girls and 33 (31.10%) boys with a mean age of  $12.5 \pm 2.4$  years. Psychiatric disorders were determined in a total of 48 (45.3%) participants; 24 (38.7%) in the chest pain group, 12 (48.0%) in the palpitation group, and 12 (63.2%) in the syncope group. Cardiological disease was detected in 17% of the cases, and the total frequencies of psychiatric disorders ( $p = 0.045$ ) were higher in patients with cardiological disease. **Conclusion:** It is clinically important to know that the frequency of psychiatric disorders is high in patients presenting at paediatric cardiology with chest pain, palpitations, and syncope. Physicians should be aware of patients' psychiatric problems and take a biopsychosocial approach in the evaluation of somatic symptoms.

Chest pain, palpitations, and syncope are among the most common reasons for referrals to paediatric cardiology.<sup>1,2</sup> Since these symptoms can be signs of serious diseases (myocardial infarction, arrhythmias etc.), they can cause anxiety in children and adolescents and their families and they are frequently referred to clinics.<sup>2</sup> Previous studies evaluating the aetiology of somatic symptoms generally used a monocausal approach. In these studies, cardiac causes were found to be less than 10% and idiopathic and psychiatric causes much higher, although psychiatric evaluation was performed in the absence of cardiological problems.<sup>3–10</sup>

Most previous studies investigating the relationship between somatic symptoms and psychiatric disorders in paediatric cardiology have focussed on chest pain.<sup>3,7,11–13</sup> These studies have reported anxiety disorders, depressive disorders, and somatoform disorders in children and adolescents presenting with chest pain. There is only one study in which an aetiological evaluation was made of palpitations in children and adolescents. In that study, which did not include a detailed psychiatric assessment, palpitations were found to be due to anxiety and stress conditions.<sup>10</sup> Studies evaluating the causes of syncope, including psychiatric assessment, are limited to cases of vasovagal syncope.<sup>14,15</sup> Depressive symptoms,<sup>14</sup> depressive disorder, anxiety disorders, and conversion disorder were detected at a higher rate than in the control group.<sup>15</sup> However, there is no previous study that has investigated psychiatric disorders in patients with cardiological disease. Comorbid psychiatric disorders with an organic condition may trigger an existing medical problem, causing more frequent symptoms or increasing perceived severity. If primary or comorbid psychiatric disorders are overlooked, patients will remain disabled and somatic symptoms will also tend to persist. Distressed patients will have recurrent visits to medical clinics, and extensive medical and financial resources will be required to monitor these patients.

Studies evaluating psychiatric disorders using standardised methods in children and adolescents presenting with palpitations and syncope are quite limited. To the best of our knowledge, there is no study in which the entire study sample of children and adolescents has been assessed with a standardised psychiatric examination. No study has compared chest pain, palpitations and syncope in terms of psychiatric disorders, and there is no study in which cases with and without cardiological disease have been compared psychiatrically. Due to the insufficient

literature on these subjects, the primary objective of this study was to investigate psychiatric disorders (anxiety, depressive, and somatoform) in children and adolescents presenting at a paediatric cardiology clinic with chest pain, palpitations, and syncope. The secondary objective was to investigate the relationship between cardiological disease and psychiatric disorders.

## Methods

### Study design and sample

A total of 121 children and adolescents who presented with primary complaints of chest pain, palpitation, or syncope at Kocaeli Derince Training and Research Hospital paediatric cardiology outpatient clinic between January and March 2015 were invited to participate in the study. Of these, 106 participants aged 8–16 years, with informed consent obtained from the patient and their parents, were included in the study. Eleven potential participants/families (9.1%) declined to participate due to time demands or did not provide any reason. Cases with intellectual disability, psychotic, or pervasive developmental disorder, severe medical disabilities (paralysis, blindness etc.), and chronic disease (epilepsy, diabetes mellitus, kidney failure etc.) were excluded from the study. Four cases with at least one of the above conditions were excluded. A comprehensive cardiac examination, electrocardiogram, and echocardiogram were performed on all participants. Following the cardiological evaluation, the psychiatric assessment was performed on the same day with the Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (KSADS PL) and the Diagnostic and Statistical Manual of Mental Disorders IV-TR (DSM IV-TR). The modules covering anxiety disorders (generalised anxiety disorder, panic disorder, separation anxiety disorder, social phobia, specific phobia), and depressive disorders of KSADS PL were performed with the child and parents by a trained rater. Somatoform disorders were evaluated using the DSM IV-TR somatoform disorders diagnostic criteria in a psychiatric examination of the child and parents. The clinician performing the psychiatric assessment was blinded to the result of the cardiac assessment. To assess the severity of anxiety and depression symptoms, the Children's Depression Inventory (CDI) and Spielberger's State-Trait Anxiety Inventory for Children (STAIC) were applied to the participants, aged 8–16 years.

### Measures

#### *Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (KSADS PL)*

The KSADS PL is a semi-structured interview scale to diagnose mental health disorders in children and adolescents aged 6–18 years, according to the diagnostic criteria in The Diagnostic and Statistical Manual of Mental Disorders III-R and IV.<sup>16</sup> The validity and reliability study of the Turkish form was performed by Gokler et al.<sup>17</sup>

#### *Child Depression Inventory (CDI)*

This scale was developed by Kovacs to assess the severity of depressive symptoms in children and adolescents. It is a self-report questionnaire of 27 items that assess negative mood, interpersonal difficulties, negative self-esteem, ineffectiveness, and anhedonia. For each item, the severity of a symptom related to depression in the last 2 weeks is marked on a scale of 0–2.<sup>18</sup> The CDI was

adapted to Turkish with a validity and reliability (test–retest 0.80) study conducted by Öy.<sup>19</sup>

#### *Spielberger's State-Trait Anxiety Inventory for Children (STAIC)*

This scale was developed by Spielberger in 1973. The State Anxiety Inventory consisting of 20 items evaluates emotions related to state anxiety, such as tension, nervousness, haste, and restlessness. Half of the items reflect the absence of uneasiness, haste and tension, and the rest reflect the presence of these situations. The highest score of 3 is given when the presence of these feelings is reported as “a lot” by the child, and the lowest score of 1 is given if the feeling is absent. The Trait Anxiety Scale, which measures persistent individual differences in anxiety susceptibility, consists of 20 items and assesses how the child “generally” feels. The frequency of occurrence of the situation given in the items is determined as “hardly-ever”, “sometimes”, or “often”. Selecting “often” results in the highest score of 3, and “hardly-ever” results in the lowest score of 1. The total score for each scale ranges from 20 to 60.<sup>20</sup> Translation into the Turkish language and validation studies were performed by Ozusta et al., and the Cronbach's coefficients were 0.82 and 0.81, respectively.<sup>21</sup>

### Statistical analysis

The data of the study were analysed statistically using SPSS 21 software. The Chi-square test was used to analyse categorical variables with Bonferroni correction for multiple pairwise comparisons. When the expected values in the contingency table were less than 5 in the Chi-square test, the p-value was determined using Fisher's exact test. Conformity of numerical data to normal distribution was analysed with the Kolmogorov–Smirnov and Shapiro–Wilk normality tests. Normally distributed numerical data were analysed using the t-test for two groups and ANOVA for more than two groups. Numerical data that did not show normal distribution were analysed with the Mann–Whitney U test for two groups and the Kruskal–Wallis test for more than two groups. In all analyses, the statistical significance level was set as  $p < 0.05$ .

### Ethics

Ethical approval for this study (Ethics Committee KOU KAİK 2014/249) was provided by the Kocaeli University Clinical Research Ethics Committee, Kocaeli, Turkey, on 14 September 2014.

### Results

Evaluation was made of 106 children and adolescents (87.6% of total enrollment), comprising 73 (68.90%) girls and 33 (31.10%) boys with a mean age of  $12.5 \pm 2.4$  years. On presentation, primary symptoms were chest pain in 62 (58.5%) patients, palpitations in 25 (23.6%), and syncope in 19 (17.9%). Cardiological disease was detected in 18 (17.0%) of 106 patients. The socio-demographic characteristics of the study participants according to the somatic symptoms and cardiological disease groups are shown in Supplementary Table 1. There was no significant difference between the frequency of cardiological disease among somatic symptoms groups ( $X^2(2, n = 106) = 3.801, p = 0.150$ ). The frequencies of cardiological diagnosis in somatic symptoms groups are shown in Table 1.

The comparisons of psychiatric disorders among somatic symptom groups and in cases with and without cardiological disease are shown in Table 2. Specific phobia, somatoform disorders, and conversion disorder were detected higher rates in syncope group than chest pain and palpitations groups (52.6%,

**Table 1.** Frequencies of cardiological diagnosis in somatic symptoms groups

	Total (n = 106)	Chest pain (n = 62)	Palpitation (n = 25)	Syncope (n = 19)
Cardiological diseases	18 (17.0)	7 (11.3)	7 (28)	4 (22.2)
Mitral valve insufficiency	7 (6.5)	3 (4.8)	3 (12)	1 (5.3)
Arrhythmia	7 (6.5)	2 (3.2)	3 (12)	2 (10.6)
Heart failure	1 (0.9)	0 (0)	1 (4)	0 (0)
Pulmonary stenosis	1 (0.9)	0 (0)	0 (0)	1 (5.3)
Aortic insufficiency	1 (0.9)	1 (1.6)	0 (0)	0 (0)
Bicuspid aortic valve	1 (0.9)	1 (1.6)	0 (0)	0 (0)

22.6%, 16.0% ( $X^2$  (2, n = 106) = 8.582,  $p = 0.014$ ), 26.3%, 4.8%, 4.0% ( $X^2$  (2, n = 106) = 9.483,  $p = 0.009$ ), 26.3%, 0%, 0% ( $X^2$  (2, n = 106) = 24.028,  $p < 0.001$ ) respectively). In cases with cardiological disease, the rate of total psychiatric disorders, total anxiety disorders, and generalised anxiety disorder were found to be higher than in cases without cardiological disease (66.7%, 40.9% ( $X^2$  (1, n = 106) = 4001,  $p = 0.045$ ), 66.7%, 31.8% ( $X^2$  (1, n = 106) = 5.042,  $p = 0.025$ ), 38.9%, 9.1% ( $X^2$  (1, n = 106) = 10.922,  $p = 0.004$ ) respectively). In addition, the CDI scores were higher in cases with cardiological disease than in cases without cardiological disease. The comparisons of psychiatric disorders among somatic symptom groups and in cases with and without cardiological disease are shown in Table 2. Specific phobia, somatoform disorders, and conversion disorder were detected at higher rates in the syncope group than in the chest pain and palpitations groups (52.6%, 22.6%, 16.0% ( $X^2$  (2, n = 106) = 8.582,  $p = 0.014$ ), 26.3%, 4.8%, 4.0% ( $X^2$  (2, n = 106) = 9.483,  $p = 0.009$ ), 26.3%, 0%, 0% ( $X^2$  (2, n = 106) = 24.028,  $p < 0.001$ ), respectively). In cases with cardiological disease, the rate of total psychiatric disorders, total anxiety disorders, and generalised anxiety disorder were found to be higher than in cases without cardiological disease (66.7%, 40.9% ( $X^2$  (1, n = 106) = 4001,  $p = 0.045$ ), 66.7%, 31.8% ( $X^2$  (1, n = 106) = 5.042,  $p = 0.025$ ), 38.9%, 9.1% ( $X^2$  (1, n = 106) = 10.922,  $p = 0.004$ ) respectively). The CDI scores were higher in cases with cardiological disease than in cases without cardiological disease (15 (10-20), 9 (6-16) ( $U = 511.5$ ,  $p = 0.018$ ) respectively). (15 (10-20), 9 (6-16) ( $U = 511.5$ ,  $p = 0.018$ ) respectively).

## Discussion

This study investigated psychiatric disorders in children and adolescents presenting with chest pain, palpitations, or syncope, and psychiatric disorders in patients with and without cardiological disease. During the 3-month study period, it was observed that the most common complaint was chest pain, followed by palpitations, and less often, syncope. Psychiatric morbidity was found in 45.3% of all participants. At least one psychiatric disorders was determined in 63.2% of the patients with syncope, 48.0% with palpitations, and 38.7% with chest pain. Specific phobia and conversion disorder were detected at a higher rate in the syncope group. cardiological disease was detected in 17% of the cases. The CDI scores, the rate of total psychiatric disorders, total anxiety

disorders, and generalised anxiety disorder were higher in cases with cardiological disease.

There is no study in literature in which the entire sample of children and adolescents has been assessed with a psychiatric examination, which could be compared with the current study. In a study using self-report scales conducted on adolescents who presented with chest pain, anxiety was detected in 67.5% and moderate-to-severe depression in 45.9% of the participants.<sup>11</sup> Studies evaluating cases without organic aetiology using psychiatric examination or self-report scales have found high anxiety and depression rates and scale scores in children and adolescents with chest pain.<sup>3,4,6,7</sup> The worldwide prevalence of any anxiety disorder in children and adolescents is 6.5% (CI 95% 4.7, 9.1), depressive disorder is 2.6% (CI 95% 1.7, 3.9),<sup>22</sup> and the annual prevalence of somatoform disorders is estimated to be between 2.3 and 4.2/100,000.<sup>23</sup> Consistent with previous studies, psychiatric disorders was detected at a higher rate than the prevalence rates in the community and anxiety disorders were found to be the most common psychiatric disorders in the chest pain group.

There is only one study in which aetiological evaluation has been made of palpitations in children and adolescents. In that study, which did not include a detailed psychiatric assessment, palpitations were found to be due to panic attacks, anxiety crises, or social stress conditions, such as school examinations or family problems in 26.1% of the cases who presented at the paediatric emergency department.<sup>10</sup> In an adult study, anxiety disorders were detected in 30% of cases, depressive disorders in 4%, and somatoform disorders in 15%.<sup>24</sup> Similar to previous studies, psychiatric disorders rates were higher than the prevalence rates in the community and anxiety disorders were found to be the most common psychiatric disorders in the palpitation group.

Previous studies evaluating the causes of syncope, including psychiatric assessment, are limited to cases of vasovagal syncope. In a study comparing depressive symptoms in children with vasovagal syncope and healthy children, subjects with vasovagal syncope showed 2.6-fold more depressive symptoms. In another study, generalised anxiety disorder, social anxiety disorder, separation anxiety disorder, major depressive disorder, and conversion disorder were detected at a higher rate in children and adolescents diagnosed with vasovagal syncope than in the control group.<sup>15</sup> Similar to that study of cases with vasovagal syncope, the current study showed high rates of psychiatric morbidity in patients presenting with syncope.

One of the major findings of the current study is that PDs were more common in patients with cardiological disease than in those without cardiological disease. In most previous studies conducted on children and adolescents, psychiatric assessment has been performed in the remaining cases after the exclusion of cardiological reasons, and psychiatric comorbidity in cases with cardiological disease has been neglected. In the aetiological evaluation of somatic symptoms, a dichotomous categorisation approach of basing the problem on either a physical or a psycho-idiopathic aetiology is a common mistake. In the current study, comorbid anxiety disorders (especially generalised anxiety disorder) and depressive symptoms were determined at a higher rate in patients with cardiological disease. In a previous study by Oliver et al., children and adolescents with CHD were shown to experience higher levels of health anxiety.<sup>25</sup> Comorbid anxiety disorders and depressive symptoms may develop due to the burden of the cardiological disease (threat and handicap). Moreover, anxiety in children with cardiological disease may lead to unnecessary hospital referrals, as increasing sympathomimetic activity or the psychophysiological

**Table 2.** Comparison of psychiatric disorders and scale scores among groups

	Total (n = 106)	Chest Pain (n = 62)	Palpitation (n = 25)	Syncope (n = 19)	Test value	p	Cardiological disease Yes (n = 18)	Cardiological disease No (n = 88)	Test value	p
Psychiatric disorders	48 (45.3)	24 (38.7)	12 (48.0)	12 (63.2)	3.606*	0.165	12 (66.7)	36 (40.9)	4.001*	0.045
Anxiety disorders	40 (37.7)	20 (32.3)	10 (40.0)	10 (52.6)	2.641*	0.267	12 (66.7)	28 (31.8)	5.042*	0.025
Specific phobia	28 (26.4)	14 (22.6) <sup>a</sup>	4 (16.0) <sup>a</sup>	10 (52.6) <sup>b</sup>	8.582*	0.014	6 (33.3)	22 (25.0)	0.534*	0.558
General Anxiety disorder	15 (14.2)	7 (11.3)	5 (20.0)	3 (15.8)	1.164*	0.559	7 (38.9)	8 (9.1)	10.922***	0.004
Social Phobia	5 (4.7)	4 (6.5)	1 (4.0)	0 (0.0)	1.384*	0.501	1 (5.6)	4 (4.6)	0.034***	1.000
Panic disorder	2 (1.9)	1 (1.6)	1 (4.0)	0 (0.0)	0.994*	0.608	1 (5.6)	1 (1.1)	1.426***	0.328
Separation Anxiety Disorder	1 (0.9)	0 (0.0)	0 (0.0)	1 (5.3)	4.623*	0.099	0 (0.0)	1 (1.1)	0.206***	1.000
Depressive disorder	8 (7.5)	3 (4.8)	2 (8.0)	3 (15.8)	2.509*	0.285	2 (11.1)	6 (6.8)	0.395***	0.621
Somatoform disorders	9 (8.5)	3 (4.8) <sup>a</sup>	1 (4.0) <sup>a</sup>	5 (26.3) <sup>b</sup>	9.483*	0.009	1 (5.6)	8 (9.1)	0.240***	1.000
Conversion disorder	5 (4.7)	0 (0.0) <sup>a</sup>	0 (0.0) <sup>a</sup>	5 (26.3) <sup>b</sup>	24.028*	< 0.001	1 (5.6)	4 (5.6)	0.034***	1.000
Pain disorder	2 (1.9)	2 (3.2)	0 (0.0)	0 (0.0)	1.447*	0.485	0 (0.0)	2 (2.3)	0.417***	1.000
Hypochondriasis	2 (1.9)	1 (1.6)	1 (4.0)	0 (0.0)	0.994*	0.608	0 (0.0)	2 (2.3)	0.467***	1.000
Spielberger's State-Trait Anxiety Inventory										
State	33 (29–40)	33 (28–40)	34 (32–41)	32 (29–35)	1.450***	0.484	34 (31–41)	33 (28–39)	893.0*****	0.395
Trait	39.1 ± 6.8	38.4 ± 7.4	40.8 ± 5.4	39.1 ± 6.4	1.140****	0.324	40.3 ± 6.4	38.8 ± 6.9	1.222*****	0.269
Child Depression Inventory	11 (7–18)	9.5 (6–16)	15 (8–20)	11 (7–20)	3.409***	0.182	15 (10–20)	9 (6–16)	511.5*****	0.018

\*Chi-square values were presented as numbers (%), and different letters indicate statistically significant differences.

\*\*Fischer exact test was used.

\*\*\*Kruskal–Wallis test values were presented as median (IQR).

\*\*\*\*ANOVA, values were presented as mean ± standard deviation.

\*\*\*\*\*Mann–Whitney U test values were presented as median (IQR).

\*\*\*\*\*T-test values were presented as mean ± standard deviation.



correlates of anxiety are misinterpreted as indicators of worsening. It has been stated that the best approach to assessing somatic symptoms is to use a biopsychosocial framework.<sup>26</sup> Problems are not regarded as either physical or psychiatric, but rather, the relative contribution of biological, psychological, and social factors should be considered.<sup>26</sup> Even if physicians have detected a physical condition that may explain the somatic symptoms, it should not be forgotten that there may be a comorbid psychiatric disorders that may cause the symptoms to become more frequent or increase in severity.

In the current study, the rates of cardiological disease detected in the chest pain group are consistent with previous studies.<sup>3,5,7,27</sup> Compared to the only study in which an aetiological evaluation was made of palpitation in children and adolescents, the rate of arrhythmia was similar; the rate of total cardiological disease was higher in the current study.<sup>10</sup> In previous studies, cardiological disease was found to be lower in cases presenting with syncope symptoms than in the current study.<sup>8,9</sup> The higher rate of cardiological disease detected in the palpitation and syncope groups may be related to the more selective referral of cases to paediatric cardiology.

The results of the present study showed no significant difference in the rate of cardiac diseases among somatic symptom groups. However, some significant differences were found in terms of co-existing psychiatric disorders. The rate of conversion disorder was higher in those presenting with syncope than in those with chest pain. Since the cases of conversion disorder frequently present with syncope, there can be expected to be a higher rate of conversion disorder in the syncope group than in the chest pain group. The rate of specific phobia was higher in the syncope group than in the palpitations and chest pain groups. Anxiety that occurs during the confrontation with phobic stimuli can stimulate sympathetic nervous outflow and facilitate or trigger the vasovagal reflex.<sup>28,29</sup> During this process, a biphasic autonomic response to feared stimuli occurs, characterised by initial increases in heart rate and blood pressure, typical of a fight-flight response, followed by decreases in blood pressure and/or heart rate that may precipitate vasovagal fainting.<sup>30</sup> Therefore, it was considered that the cases with specific phobia presented at the cardiology clinic more frequently with the complaint of syncope.

This study had some limitations, primarily that it was not of a longitudinal design to establish a cause-effect relationship between the cardiological complaints and psychiatric disorders detected and the somatic symptoms at presentation. Second, the generalisability of findings may be limited since the relatively low number of patients in the sample consisted of cases who presented at the paediatric cardiology clinic in a tertiary health centre. A third limitation was the use of DSM IV-TR criteria to avoid incompatibility between the diagnostic criteria since the KSADS has not yet been updated to DSM-5, although DSM-5 was in use at the time of data collection. Finally, no questionnaire was used to assess the severity of somatoform symptoms. There is a need for further longitudinal, large scale studies to confirm these findings and to examine the persistence of psychiatric disorders and chest pain, palpitations, and syncope over time.

In conclusion, PDs were more common than cardiological disease in patients who presented at the paediatric cardiology clinics with chest pain, palpitations, and syncope. It is clinically important to know that approximately one-third of patients with chest pain, half of the patients with palpitations, and two-thirds of patients with syncope have anxiety, depressive, and somatoform disorders. This indicates that a routine psychiatric assessment is needed to

evaluate somatic symptoms. Symptom checklists can be used for psychiatric assessment, and cases with high symptom levels should be referred for detailed psychiatric evaluation and treatment. Moreover, routine referral for detailed psychiatric evaluation may be considered in cases of syncope due to the very high presence of PDs. In addition, PDs were detected at a higher rate in patients with cardiological disease than in those without cardiological disease. Whether an organic condition is detected or not, somatic symptoms triggered or increased due to psychiatric disorders may tend to be persistent if the existing psychiatric disorders is overlooked. Patients with ongoing complaints will have unnecessary medical follow-up and diagnostic procedures, requiring extensive medical and financial resources. Physicians should be aware of patients' psychiatric problems through a biopsychosocial approach to the evaluation of somatic symptoms, and the diagnostic workup should include a psychiatric assessment.

**Supplementary material.** To view supplementary material for this article, please visit <https://doi.org/10.1017/S1047951122001949>

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**Conflicts of interest.** None.

**Ethical standards.** The authors assert that all procedures contributing to this work comply with the ethical standards of the World Medical Association relevant guidelines on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008, and has been approved by the institutional review board (IRB).

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