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Psychiatric Evaluation of Children and Adolescents with Mitral Valve Prolapse and Examination of Their Caregivers' Coping Styles with Stress: A Cross-Sectional Study

Mitral Kapak Prolapsusu Olan Çocuk ve Ergenlerde Psikiyatrik Değerlendirme ve Bakımverenlerinin Stresle Başa Çıkma Tarzlarının İncelenmesi: Kesitsel Bir Çalışma

Tuğçe ATAŞ[a], Işık GÖRKER[b], Murat DEVECİ[c]

[a]Artvin State Hospital, Clinic of Child and Adolescent Psychiatry, Artvin, Türkiye
[b]Trakya University Faculty of Medicine, Department of Child and Adolescent Psychiatry, Edirne, Türkiye
[c]Trakya University Faculty of Medicine, Department of Pediatric Cardiology, Edirne, Türkiye

ABSTRACT Objective: In this cross-sectional study, the psychiatric conditions of children and adolescents diagnosed with mitral valve prolapse (MVP) and the anxiety levels and stress coping strategies of their caregivers were examined and compared with healthy controls. **Material and Methods:** The study included 76 patients with MVP and 76 healthy controls. Participants were administered the Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Versions-Diagnostic and Statistical Manual of Mental Disorders 5-Turkish Adaptation, the State-Trait Anxiety Scale (STAS) or the State-Trait Anxiety Scale for children, and the Strengths and Difficulties Questionnaire-Adolescent Form for children aged 11 and older. The sociodemographic data form, the Strengths and Difficulties Questionnaire, the State-Trait Anxiety Scale, and the Stress Coping Styles Scale were administered to the caregivers of all patients. **Results:** 88.2% of patients with MVP were found to have at least one lifetime psychiatric diagnosis and lifetime diagnosis rates of panic disorder, separation anxiety disorder, enuresis, test anxiety were higher compared to the control group. Caregivers of patients with MVP were found to have significantly higher mean scores on self-confidence and social support-seeking approaches than the control group. A relationship was observed between the coping styles of caregivers of patients with MVP and some psychological symptoms of the patients. **Conclusion:** The results of our study demonstrated that anxiety disorder subtypes such as separation anxiety disorder, panic disorder, test anxiety disorder were more common in patients with MVP and that there was an interaction between caregivers' coping styles and the patients' psychological symptoms.

Keywords: Mitral valve prolapse; child; psychiatry; coping

ÖZET Amaç: Bu kesitsel araştırmada, mitral kapak prolapsusu (MVP) tanısı olan çocuk ve ergenlerin psikiyatrik durumları ile bakım verenlerinin kaygı düzeyleri ve stresle başa çıkma tarzları incelenmiş, sağlıklı kontrollerle karşılaştırılmıştır. **Gereç ve Yöntemler:** Çalışmaya 76 MVP'li olgu ve 76 sağlıklı kontrol dahil edilmiştir. Katılımcılara Okul Çağı Çocukları için Duygulanım Bozuklukları ve Şizofreni Görüşme Çizelgesi-Şimdi ve Yaşam Boyu Versiyonu- Mental Bozuklukların Tanısal ve Sayımsal El Kitabı 5-Türkçe Uyarlaması, durumluk-sürekli kaygı ölçeği ya da çocuklar için durumluluk-sürekli kaygı ölçeği, 11 yaş ve üzeri olgular için güçler ve güçlükler anketi-ergen formu uygulanmıştır. Tüm olguların bakım verenlerine sosyodemografik veri formu, güçler güçlükler anketi, durumluk-sürekli kaygı ölçeği, stresle başa çıkma tarzı ölçeği uygulanmıştır. **Bulgular:** MVP tanılı olguların %88,2'sinin yaşam boyu en az bir psikiyatrik tanı aldıkları ve yaşam boyu panik bozukluk, ayrılık anksiyetesi bozukluğu, enürezis, sınav kaygısı tanı oranlarının kontrol grubuna kıyasla daha yüksek olduğu tespit edilmiştir. Mitral kapak prolapsusu olan olguların bakım verenlerinin kendine güvenli ve sosyal destek arama yaklaşımı skor ortalamalarının kontrol grubundan anlamlı düzeyde daha yüksek olduğu bulunmuştur. Mitral kapak prolapsusu olan olguların bakım verenlerinin başa çıkma tarzları ile olguların bazı ruhsal belirtileri arasında ilişki olduğu görülmüştür. **Sonuç:** Çalışmamızın sonuçları, mitral kapak prolapsusu olan olgularda ayrılık kaygısı bozukluğu, panik bozukluğu ve sınav kaygısı bozukluğu gibi kaygı bozukluğu alt tiplerinin daha sık görüldüğünü, bakım verenlerinin başa çıkma tarzları ile olguların ruhsal belirtileri arasında karşılıklı etkileşim olduğunu göstermiştir.

Anahtar Kelimeler: Mitral kapak prolapsusu; çocuk; psikiyatri; başa çıkma

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Correspondence: Tuğçe ATAŞ
Artvin State Hospital, Clinic of Child and Adolescent Psychiatry, Artvin, Türkiye
E-mail: tugce.atas.cap@gmail.com

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Mitral valve prolapse (MVP) is a common disorder where the mitral leaflets abnormally protrude into the left atrium during ventricular contraction due to fibromyxomatous changes.[1,2] It affects about 2-6% of the population.[3] In children and adolescents,prevalence varies depending on diagnostic criteria. For instance, Rizzon et al., applying stricter echocardiographic definitions, reported a prevalence as low as 0.3%.[4] In recent years, the potential link between MVP and panic disorder has been extensively studied. Some studies have found no evidence of a connection between MVP and panic or other anxiety disorders. The association between MVP and anxiety or panic disorders in children, in particular, remains unclear. However, the majority of studies indicate a significant association between panic disorder and MVP.[5,6] Research and clinical observations suggest that children with medical conditions are at a much higher risk of experiencing psychiatric and psychosocial challenges than their peers in the general population. Children with chronic medical conditions are 2 to 4 times more likely to experience mental health issues than those in the general population. Psychiatric disorders accompanying chronic medical diseases can cause significant problems in functional areas such as family and peer relationships, academic performance, participation in daily activities and compliance with treatment in children and adolescents.[7] Chronic diseases negatively affect the family as well as the child. Parents of children with medical conditions often struggle with accepting the diagnosis and prognosis, worry about the future, and find it challenging to balance the demands of their child's illness with their own personal and daily responsibilities. Stress factors, such as the financial burden of ongoing care, can strain marital relationships and contribute to increased mental health issues like anxiety and depression. Consequently, a rise in psychological problems, including anxiety and depression, has been observed among these parents.[8-10] Additionally, Grootenhuis et al. found that as the number of hospitalizations and the decline in the child's functionality increased, the emotional distress experienced by parents also heightened.[10] The concept of coping, which consists of the behavioral and cognitive efforts of the individual to meet requirements and difficulties created by the inner and outer world, to keep it under control and to reduce tension; is an important factor in psychological adjustment. Research has shown that the coping abilities of parents are essential in helping both the family and the child adjust to the situation. Parents who employ active and adaptive coping strategies tend to experience fewer psychiatric issues, and their children exhibit better psychosocial adjustment.[11] Our study is aimed to determine psychiatric disorders accompanying MVP in children and adolescents and to examine stress coping styles and anxiety levels of the caregivers of children diagnosed with MVP, which is a chronic medical disorder.

MATERIAL AND METHODS

STUDY PARTICIPANTS

The case group consisted of children and adolescents diagnosed with MVP, either newly or under follow-up and their caregivers. Those with autism spectrum disorder, intellectual disability or other chronic conditions were excluded. The control group included children, adolescents and caregivers without chronic medical or psychiatric history. Caregivers completed the Strengths and Difficulties Questionnaire (SDQ), Ways of Coping with Stress Inventory (WCI), State-Trait Anxiety Inventory (STAI) and a Sociodemographic Data Form. Children and adolescents completed the STAI or STAI-C; participants aged 11-16 also filled out the SDQ-Adolescent Form. Psychiatric evaluations were performed using the K-SADS-PL structured interview based on DSM-5 criteria. The study was approved by the Trakya University Scientific Research Ethics Committee (No: 09/26, 12/04/2021) and conducted according to the Declaration of Helsinki. Written informed consent was obtained from all participants and caregivers.

MEASUREMENTS

Sociodemographic Data Form

Collected age, gender, education,parental age, education, occupation, income, medical and psychiatric history and MVP-specific clinical data.

STAI/STAI-C: The State-Trait Anxiety Inventory for adults and children assessed state and trait anxiety, with higher scores indicating greater anxiety.[12,13]

Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version, DSM-5 (K-SADS-PL-DSM-5-T): Semi-structured interview for current and lifetime psychiatric disorders in children/adolescents, adapted to DSM-5.[14]

The Strength and Difficulties Questionnaire (SDQ)

Short behavioral screening tool,parent version for ages 4-16 and self-report for ages 11-16.[15]

Ways of Coping Inventory

It includes self-confident, helpless, submissive, optimistic, and social support-seeking coping styles.[16]

STATISTICAL ANALYSIS

Descriptive statistics (mean, SD, median, frequency, percentage) were calculated. Group comparisons used Kruskal-Wallis, Mann-Whitney U and Chi-square tests; correlations were assessed with Pearson and Spearman methods. Analyses were performed in IBM SPSS Statistics 22.0 (IBM Corp., Armonk, New York, USA) with $p<0.05$ considered significant.

RESULTS

No significant differences were found between MVP and control groups in age, gender, parental education, income, or health history (Table 1, $p>0.05$). Parent-reported SDQ scores showed no difference (Table 2, $p>0.05$), but adolescent self-reports indicated lower ADHD ($p=0.002$) and total difficulties ($p=0.036$) in the MVP group. STAI scores of children, adolescents, and caregivers showed no group differences (Table 3, $p>0.05$). Caregivers in both groups mainly used a self-confident approach; MVP caregivers had higher self-confidence ($p=0.047$) and social support-seeking scores ($p<0.001$) (Table 4). Based on K-SADS-PL, current diagnoses of separation anxiety disorder ($p<0.001$), test anxiety ($p=0.001$), and panic disorder ($p=0.028$) were significantly higher in MVP patients. Lifetime diagnoses of separation anxiety disorder ($p=0.020$), panic disorder ($p=0.014$), enuresis ($p=0.006$), and test anxiety ($p=0.001$) were also more frequent (Table 5). Overall, 80.3% of MVP cases had a current psychiatric disorder vs. 46.1% of controls ($p<0.001$), and 88.2% had a lifetime disorder vs. 50% of controls ($p<0.001$).In MVP caregivers, self-confident coping negatively correlated with STAI-S ($r=-0.406$,

TABLE 1: Demographic characteristics of participants with MVP and the control group

Study population (n=152)	MVP group (n=76)		Control group (n=76)		p value
	n/X	%/SD	n/X	%/SD	
Age (year)	12.54±2.87		12.07±2.63		0.290
Gender n (%)					
Male	16 (21.1)		26 (34.2)		0.07
Female	60 (78.9)		50 (65.8)		0.07
Child education level n (%)					
Primary school	23 (30.3)		23 (30.3)		0.65
Secondary school	19 (25.0)		31 (40.8)		0.65
High school	34 (44.7)		22 (28.9)		0.65
Parent's age (year)					
Mother	38.87±6.50		40.15±5.70		0.201
Father	41.82±5.84		42.86±5.52		0.262
History of chronic illness in parents, n (%)					
Mother	25 (32.9)		28 (36.8)		0.61
Father	8 (10.5)		16 (21.1)		0.675
History of psychiatric illness in parents, n (%)					
Mother	21 (27.6)		23 (30.3)		0.721
Father	13 (17.1)		6 (7.9)		0.086
Mother's education, n (%)					
Primary school	17 (22.4)		14 (18.4)		0.25
Secondary school	23 (30.3)		13(17.1)		
High school	13 (17.1)		21 (27.6)		
University	18 (23.7)		25 (32.9)		
Father's education, n (%)					
Primary school	16 (21.1)		8 (10.5)		0.07
Secondary school	16 (21.1)		18(23.7)		
High school	30 (39.5)		21 (27.6)		
University	14 (18.4)		26 (34.2)		
Income level, n (%)					
Low	3 (3.9)		6 (7.9)		0.649
Middle	29 (38.2)		28 (36.8)		
High	44 (57.9)		42 (553)		

MVP: Mitral valve prolapse; SD: Standard deviation

TABLE 2: Comparison of SDQ scores of MVP and control groups

	Groups							
	MVP			Control				
Parents	**n[a]**	**X**	**SD**	**n[a]**	**X**	**SD**	**Analysis**	**p value**
SDQ-emotional symptoms	76	2.91	2.16	76	2.99	2.45	t=-0.21	0.834
SDQ-conduct problems	76	1.25	1.47	76	1.55	1.54	Z=-1.58	0.115
SDQ-ADHD	76	3.12	2.53	76	3.42	2.17	t=-0.79	0.430
SDQ-peer relationship problems	76	2.41	1.66	76	2.46	1.60	t=-0.20	0.842
SDQ-pro social behaviour	76	8.58	1.70	76	8.16	1.74	t=1.51	0.134
SDQ-total difficulties	76	9.68	5.56	76	10.47	5.85	t=-0.85	0.395
Young-self reports	**n[a]**	**X**	**SD**	**n[a]**	**X**	**SD**	**Analysis**	**p value**
SDQ-emotional symptoms	47	2.64	1.99	47	3.34	2.51	t=-1.50	0.137
SDQ-conduct problems	47	1.66	1.37	47	2.19	1.93	Z=-1.13	0.206
SDQ-ADHD	47	2.72	1.64	47	4.09	2.39	**t=-3.22**	**0.002**
SDQ-peer relationship problems	47	2.43	1.61	47	2.87	1.64	Z=-1.45	0.147
SDQ-pro social behaviour	47	8.66	1.74	47	8.19	1.47	Z=-1.41	0.162
SDQ-total difficulties	47	9.45	4.85	47	12.47	6.54	**Z=-2.10**	**0.036**

[a]n is the number of evaluated participants. SDQ: Strength and Difficulties Questionnaire; MVP: Mitral valve prolapse; SD: Standard Deviation; ADHD: Attention deficit hyperactivity disorder

TABLE 3: Comparison of STAI scores of MVP and control groups

	Groups							
	MVP			Control				
	n	**X**	**SD**	**n**	**X**	**SD**	**Analysis**	**p value**
STAI-C-S	41	35.27	9.02	47	33.38	8.84	t=0.99	0.326
STAI-C-T	41	29.93	5.73	47	30.7	8.22	Z=-0.12	0.903
	Groups							
	MVP			Control				
	n	**X**	**SD**	**n**	**X**	**SD**	**t value**	**p value**
STAI-S (adolescent)	35	32.80	7.23	29	34.28	7.26	-0.89	0.376
STAI-T (adolescent)	35	38.49	8.63	29	39.83	7.48	-0.90	0.369
	Groups							
	MVP			Control				
	n	**X**	**SD**	**n**	**X**	**SD**	**t value**	**p value**
STAI-S (parents)	76	32.61	9.38	76	32.74	8.53	-0.91	0.928
STAI-T (parents)	76	38.79	7.89	76	40.62	9.37	-1.3	0.195

STAI: State-Trait Anxiety Inventory; MVP: Mitral valve prolapse; SD: Standard deviation; STAI-C-S: State-Trait Anxiety Inventories for Children-State; STAI-C-T: State-Trait Anxiety Inventories for Children-Trait; STAI-S: State-Trait Anxiety Inventories-State; STAI-T: State-Trait Anxiety Inventories-Trait

TABLE 4: Comparison of ways of coping scores of MVP and control groups

	Groups							
	MVP			Control				
Response	**n**	**X**	**SD**	**n**	**X**	**SD**	**Analysis**	**p value**
Self-confident[a]	76	17.22	3.38	76	16.09	3.6	**t=2.00**	**0.047**
Helpless[b]	76	6.92	4.6	76	7.78	4.49	Z=-1.41	0.160
Optimistic[a]	76	11.05	2.75	76	10.2	3.22	t=1.76	0.081
Submissive[a]	76	5.78	3.53	76	5.82	3.33	Z=-0.19	0.853
Seeking social supports[a]	76	8.51	2.11	76	6.89	2.4	**t=4.41**	**<0.001**

[a]Pearson Correlation Analysis; [b]Spearman correlation analysis; MVP: Mitral Valve Prolapse. SD: Standard deviation

p<0.001) and STAI-T (r=-0.316, p=0.005); helpless style correlated positively with STAI-S (r=0.313, p=0.006) and STAI-T (r=0.669, p<0.001). Optimistic style correlated negatively with STAI-S (r=-0.355, p=0.002) and STAI-T (r=-0.292, p=0.011). Submissive style correlated positively with caregiver STAI-T (r=0.309, p=0.007) and subject STAI-T (r=0.385, p=0.022) (Table 6).

DISCUSSION

This is a cross-sectional study in which children and adolescents with MVP were evaluated with a semi-structured clinical interview form in terms of accompanying psychopathologies, their anxiety levels and psychiatric symptoms and then compared with their healthy peers, and their caregivers' coping styles and anxiety levels were examined.

Although the relationship between MVP and anxiety disorders, particularly panic disorder and social anxiety disorder, remains a subject of ongoing debate, the current evidence is deemed insufficient to

TABLE 5: Comparison of the present and lifetime psychiatric diagnoses of the participants evaluated in the study between the groups

Psychiatric diagnosis (Present)	Groups				p value*
	MVP		Control		
	n	%	n	%	
Separation anxiety disorder	15	19.7	2	2.6	**<0.001**
Attention deficit and hyperactivity disorder	13	17.1	9	11.8	0.850
Tic disorder	2	2.6	0	0.0	0.497
Enuresis	2	2.6	0	0.0	0.497
Oppositional/defiant disorder	0	0.0	1	1.3	-
Major depressive disorder	2	2.6	3	3.9	0.999
Specific phobia	32	42.1	22	28.9	0.090
Obsessive compulsive disorder	2	2.6	0	0.0	0.497
Social anxiety disorder	13	17.1	7	9.2	0.073
Test anxiety	10	13.2	0	0.0	**0.001**
Generalized anxiety disorder	6	7.9	3	3.9	0.494
Panic disorder	6	7.9	0	0.0	**0.028**
Adjustment disorder with depressive features	0	0.0	1	1.3	-

Psychiatric diagnosis (Lifetime)	Groups				p value*
	MVP		Control		
	n	%	n	%	
Major depressive disorder	15	19.7	2	2.6	**<0.001**
Generalized anxiety disorder	13	17.1	9	11.8	0.850
Separation anxiety disorder	2	2.6	0	0.0	0.497
Social anxiety disorder	2	2.6	0	0.0	0.497
Panic disorder	0	0.0	1	1.3	-
Specific phobia	2	2.6	3	3.9	0.999
Obsessive compulsive disorder	32	42.1	22	28.9	0.090
Attention deficit and hyperactivity disorder	2	2.6	0	0.0	0.497
Oppositional defiant disorder	13	17.1	7	9.2	0.073
Tic disorder	10	13.2	0	0.0	**0.001**
Enuresis	6	7.9	3	3.9	0.494
Encopresis	6	7.9	0	0.0	**0.028**
Adjustment disorder with depressive features	0	0.0	1	1.3	-

MVP: Mitral valve prolapse

confirm or definitively rule out this connection.[17,18] A review of the literature indicates that there are few published studies on psychiatric disorders in children and adolescents with MVP with the majority of research primarily concentrating on the connection between MVP and anxiety disorders, particularly panic disorder. For instance, Casat et al. presented a case of separation anxiety disorder alongside findings of MVP in a 12-year-old girl.[19] In a study,it was stated that separation anxiety disorder is associated with MVP and that 40% of agoraphobics with panic attacks might have MVP. The finding of a higher rate of separation anxiety disorder in MVP patients compared to the control group in our study is consistent with previous research that suggests a link between MVP and anxiety disorders. However, there are very few studies investigating the prevalence of panic disorder in children and adolescents with MVP. Vitiellove et al. reported a case linking MVP with panic disorder in children. In another study, they identified six boys aged 8-13 who met the DSM-III criteria for panic disorder, with two of them being diagnosed with MVP through echocardiographic evaluation.[20] When we look at the studies in the adult population in the literature;It is observed that the prevalence of panic disorder in MVP cases varies between 0-24%.[21] Margraf et al. in a review in which they reviewed the studies done, up to that period; they reported the prevalence of panic disorder as 8% in MVP cases, 5% in the control group of cardiac patients, and 2% in the control group of healthy individuals.[18] In our study, the current prevalence of panic disorder in MVP cases was 7.9%, while the lifetime prevalence was 9.2%, both of which were significantly higher than in the control group. The findings of our study are consistent with research that supports a relationship between MVP and panic disorder. Additionally, the rates of current and lifetime test anxiety in MVP cases were found to be 13.2%, significantly higher than in the control group. Notably, no studies were identified in the literature that specifically evaluate the relationship between MVP and test anxiety. According to the DSM-5, test anxiety is viewed as a subtype or presentation of anxiety disorders, especially specific phobias, panic disorder, social anxiety disorder, and generalized anxiety disorder. However,

TABLE 6: Investigation of the relationship between the STAI scores of the patients and their caregivers in the MVP group and the subtest scores of the Caregivers of the Scale of Coping with Stress

		Self-confident[a]	Helpless[b]	Optimistic[a]	Submissive[a]	Seeking social supports[a]
STAI-S (caregivers)	r value	**-0.406****	**0.313****	**-0.355****	0.056	-0.218
	p value	0.000	0.006	0.002	0.630	0.059
STAI-T (caregivers)	r value	**-0.316****	**0.669****	**-0.292***	**0.309****	-0.081
	p value	0.005	0.000	0.011	0.007	0.489
STAI-S	r value	-0.199	0.218	0.081	0.108	-0.207
	p value	0.251	0.209	0.645	0.538	0.233
STAI-T	r value	-0.001	0.178	**0.363***	**0.385***	0.026
	p value	0.996	0.306	0.032	0.022	0.881
STAI-C-T	r value	-0.178	0.203	-0.019	-0.186	0.132
	p value	0.265	0.203	0.904	0.244	0.409
STAI-C-S	r value	-0.069	0.107	0.108	-0.032	-0.107
	p value	0.668	0.506	0.503	0.842	0.507

*p<0.05 **p<0.01; [a]Pearson correlation analysis; [b]Spearman correlation analysis; STAI: State-Trait Anxiety Inventory; MVP: Mitral valve prolapse, STAI-S: State-Trait Anxiety Inventories-State; STAI-T: State-Trait Anxiety Inventories-Trait; STAI-C-T: State-Trait Anxiety Inventories for Children-Trait; STAI-C-S: State-Trait Anxiety Inventories for Children-State

many instances of test anxiety may not fully fulfill the diagnostic criteria for these disorders.[22,23] Given that test anxiety is a clinical manifestation within the spectrum of anxiety disorders, the higher rate of test anxiety observed in MVP cases compared to the control group further supports the relationship between anxiety disorders and MVP.

The increased prevalence of panic disorder and test anxiety in MVP may stem from autonomic dysfunction. MVP is associated with heightened sympathetic activity, β-adrenergic sensitivity, and altered catecholamine metabolism, producing symptoms like palpitations, chest tightness, and dizziness that can trigger panic attacks. Similar autonomic hypersensitivity in panic disorder suggests a shared pathway. Baroreflex abnormalities, low intravascular volume, and heightened somatic vigilance may further predispose MVP patients to panic symptoms.

Additionally, our study found that the lifetime prevalence of enuresis was significantly higher in patients with MVP compared to the control group. Notably, all cases diagnosed with enuresis were found to have nocturnal enuresis. No study has been found in the literature evaluating the relationship between MVP and enuresis. Studies have shown that patients with MVP have neuroendocrine and autonomic dysfunctions such as catecholamine regulation abnormality, high adrenergic activity, β-adrenergic receptor abnormality, hypersensitivity to adrenergic stimulation,parasympathetic abnormality, low intravascular volume, baroreflex abnormality, abnormal regulation of renin aldosterone.[24] When we look at the studies on nocturnal enuresis in children,it is stated that the sympathetic and parasympathetic systems play a role in the etiology.[25] The significantly higher lifetime diagnosis of enuresis in cases with MVP compared to the control group may be attributed to shared etiological factors between MVP and nocturnal enuresis.

Anxiety disorders are the most common psychiatric disorders in childhood. Specific phobias, on the other hand, are the most frequent among these anxiety disorders.[26] In our study, consistent with the literature, specific phobia was identified as the most common anxiety disorder in both patients with MVP and the control group.

There are few studies examining the relationship between MVP and generalized anxiety disorder. When we look at a study conducted in adult individuals; M-mode echocardiography was used to evaluate patients with generalized anxiety disorder according to DSM-III and a diagnosis of MVP was found at a rate of 15% and it was stated that this result was not different from the rate of MVP in the normal popula-

tion.[27] In our study, generalized anxiety disorder was found at a higher rate in MVP cases compared to the control group, although the difference was not statistically significant. As there are no existing studies in the literature examining the prevalence of generalized anxiety disorder in children and adolescents with MVP, the findings of our study could provide valuable insights into this area.

Additionally, no studies have been found that explore the relationship between social anxiety disorder and children and adolescents with MVP. In our study, the current and lifetime prevalence of social anxiety disorder in MVP cases was 17.1%, which was higher than in the control group; however, this difference was not statistically significant. We believe that our findings will enhance the existing literature on this topic.

Our study was conducted during the coronavirus disease-2019 (COVID-19) pandemic. In a review examining the effects of restrictions during the COVID-19 pandemic on the mental health of children and adolescents, it was stated that separation from the primary caregiver due to isolation could make the child more vulnerable and pose a threat to mental health. A study conducted in China found that the most common mental and behavioral problems among children and adolescents during the COVID-19 pandemic were clinging behavior, separation anxiety, distraction, irritability, and fear of asking questions about the pandemic.[28] Although the control group was selected from people with no history of psychiatric admission or psychiatric treatment; considering the characteristics of the COVID-19 pandemic process in our country that negatively affect routine life, this may explain why the rates of generalized anxiety disorder and social anxiety disorder in the control group in our study were not statistically different from the rates found in MVP cases.

In our study, we found that the rates of having at least one mental disorder in the past, present, and lifetime among cases diagnosed with MVP, as assessed by KSADS-PL, were significantly higher than those in the control group. It is noted that children and adolescents with chronic diseases tend to have more emotional and behavioral problems.[29] In a study, it was found that internalizing problems are frequently seen in adolescents with congenital heart disease.[30] The results of our study seem to align with the existing literature.

In this study, adolescent participators in the comparison group reported significantly higher scores on the attention deficit and hyperactivity subscale, as well as total difficulty scores, compared to the MVP group, according to the adolescent form of the Strengths and Difficulties Questionnaire. Considering the restrictions brought in our country due to the COVID-19 pandemic, the interruption of formal education, the online education conditions, the regulations made regarding the exam system, the mental difficulties of individuals in a challenging period such as adolescence and adapting to the changes in the education system, attention and focus. It is not surprising that they stated their difficulties in the self-report form. Due to these influencing factors, the high volunteer rate of adolescents in the control group participating in our study may also help explain our findings.

To assess anxiety levels, the STAI and STAI-C were administered to both child and adolescent participants in this study. There was no significant difference between the MVP and control groups in terms of STAI and STAI-C scores. Similarly, in a study by Smith et al., which compared symptomatic and asymptomatic subjects aged 9-18 years with MVP to those without MVP regarding STAI scores, no significant differences were found between the groups.[31,32] This suggests that the results of our study are in line with their findings. Furthermore, caregivers' anxiety levels were assessed using the STAI, a self-report scale, and no statistically significant differences were observed between the groups. No study has been found in the literature on the anxiety level of caregivers of children with MVP. It is thought that our study contributes to the literature. The discrepancy between higher rates of diagnosed anxiety disorders in the MVP group and the lack of significant differences in STAI scores (both child/adolescent and caregiver versions) may be attributed to several factors. These factors can be grouped under methodological, psychological, and contextual headings: The STAI is a self-report measure. Children and adoles-

cents may underreport symptoms due to lack of insight, denial, social desirability, or misunderstanding the questions. The STAI assesses general anxiety (state and trait) but may not capture specific anxiety manifestations like separation anxiety, panic attacks, or test anxiety, which were more prevalent in the MVP group. As noted in the discussion section, the study took place during the COVID-19 pandemic. Disruptions in routine life may have impacted both the MVP and control groups similarly, possibly muting group differences in reported anxiety. The psychiatric diagnoses were determined using the K-SADS-PL (a semi-structured clinical interview based on DSM-5 criteria), which tends to be more sensitive and clinically nuanced than a self-report tool like the STAI. This methodological difference explains why more anxiety disorders were picked up in interviews despite stable STAI scores.

In addition to the psychiatric diagnoses evaluated using KSADS-PL, behavioral and emotional functioning was assessed using the Strengths and Difficulties Questionnaire (SDQ). Interestingly, while parent-reported SDQ scores did not differ significantly between groups, adolescent self-reports revealed significantly lower scores for attention deficit, hyperactivity, and total difficulties in the MVP group compared to controls. This finding contrasts with prior literature suggesting increased psychosocial difficulties in children with chronic illnesses. One possible explanation is the contextual impact of the COVID-19 pandemic, which may have disproportionately affected adolescents in the control group, leading to elevated self-reported symptoms. This discrepancy also underscores the importance of using multi-informant approaches when assessing mental health in pediatric populations.

It is stated that the need for social support of families of children with a chronic disease is much higher than that of families with healthy children.[32] No study has been found in the literature on coping processes in caregivers of patients with MVP. In our study, the mean scores for the self-confident approach and seeking social support among caregivers of patients with MVP, as measured by the WCI, were significantly higher than those in the control group. This suggests that caregivers of patients with MVP are more likely to use active coping strategies, such as self-confidence and seeking support, to manage stress, while relying less on passive methods.

However, it is important to note that our findings do not clarify whether these coping styles were developed in response to the MVP diagnosis or if they were already characteristic of these caregivers prior to the diagnosis. Longitudinal studies are needed to examine whether the experience of managing a chronic illness like MVP fosters adaptive coping, or if families who naturally employ such coping mechanisms are better equipped to handle a diagnosis. Additionally, the influence of personality traits, socio-economic factors, and social support availability on coping style adoption should be considered in future studies. Although active coping strategies are generally associated with better psychological outcomes, their potential limitations must also be acknowledged. For example,overreliance on social support may lead to emotional exhaustion if the caregiver lacks a strong or responsive support network. Similarly, a self-confident approach, if rigid or unaccompanied by accurate appraisal of the situation, may lead to denial or underestimation of the seriousness of medical needs. Additionally, a negative correlation was observed between active coping styles, such as the self-confident and optimistic approaches and the anxiety levels of caregivers. A positive correlation was found between emotional-passive coping styles such as the helpless approach and the submissive approach and the anxiety levels of caregivers. It was found that there was a positive correlation between the helpless approach subtest scores of the caregivers of cases with MVP and SDQ-emotional problems, SDQ-total difficulties and STAI-S, STAI-T scores of the caregivers according to the SDQ parent form. It was found that there was a negative correlation between the optimistic approach subtest scores of the caregivers of cases with MVP and maternal age, SDQ-behavioral problems according to the SDQ-parent form, STAI-S and STAI-T scores of the caregivers; and there was a positive correlation between the optimistic approach subtest scores and SDQ-emotional problems according to the SDQ-adolescent form and STAI-T scores of the cases. There are studies in the literature that provide

evidence that general and illness-related parenting stress is associated with negative psychological adjustment in caregivers and children.[33] Davis et al. found that low mental health and adjustment level of parents of children with congenital heart disease were associated with maladaptive coping strategies.[34] Another study found that emotion-focused coping mechanisms (eg,avoidance) were associated with greater overall parenting stress.[35] It can be stated that the results of our study align with findings from the existing literature. In both the acute and chronic stages following the diagnosis of the disease, both the child and their family face many psychosocial challenges. Although the course of MVP is generally good, it requires medical follow-up at certain intervals, medical treatment in some cases and panic attacks experienced by the cases create confusion in many families and cause families to worry about the health of their children. At this point, it is very important to know the problems experienced by the family during the diagnosis and treatment of the disease by the medical team and to provide a multidisciplinary treatment approach. In appropriate cases, psychiatric consultations can improve treatment compliance and enhance the quality of life for both children and their families.

Children's psychiatric diagnoses were established with the validated K-SADS-PL-DSM-5-T, while parents' psychiatric history was based only on self-report, which may have led to underreporting. Still, caregiver coping styles were closely linked to anxiety: self-confident and support-seeking strategies correlated with lower levels,whereas helpless and submissive styles correlated with higher levels. These results emphasize the impact of caregiver mental health on stress management in MVP and the need for structured diagnostic tools in future studies.

LIMITATIONS

This study has several limitations. Apart from the K-SADS-PL, assessments relied on self-reports, which may be affected by bias and were limited to specific age groups. Its cross-sectional design prevents causal conclusions and the small sample size reduces generalizability and statistical power. In addition, follow-up duration, psychiatric monitoring, treatment history, and medication use were not systematically evaluated, which may have influenced both patient outcomes and caregiver coping styles. Future longitudinal studies with larger samples and detailed clinical follow-up are needed.

CONCLUSION

In this study,88.2% of children and adolescents with MVP had at least one lifetime psychiatric diagnosis. Panic disorder,separation anxiety disorder, enuresis and test anxiety were more common compared to controls. Caregivers of MVP patients showed higher self-confident and social support–seeking coping styles, which were associated with the patients' psychological symptoms. Overall, anxiety disorder subtypes were more frequent in MVP cases, and caregiver coping styles were closely linked to the children's psychiatric outcomes.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Tuğçe Ataş, Işık Görker;* ***Design:*** *Tuğçe Ataş, Işık Görker;* ***Control/Supervision:*** *Tuğçe Ataş, Işık Görker, Murat Deveci;* ***Data Collection and/or Processing:*** *Tuğçe Ataş;* ***Analysis and/or Interpretation:*** *Tuğçe Ataş;* ***Writing the Article:*** *Tuğçe Ataş;* ***Critical Review:*** *Işık Görker;* ***References and Fundings:*** *Tuğçe Ataş;* ***Materials:*** *Tuğçe Ataş, Işık Görker, Murat Deveci.*

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