Rheumatology
INTERNATIONAL

OBSERVATIONAL RESEARCH

Psychosocial and clinical effects of the COVID-19 pandemic in patients with childhood rheumatic diseases and their parents

Gizem Durcan[1] · Kenan Barut[2] · Fatih Haslak[2] · Hilal Doktur[1] · Mehmet Yildiz[2] · Amra Adrovic[2] ·
Sezgin Sahin[2] · Ozgur Kasapcopur[2]

Abstract

This study aimed to evaluate the psychological symptoms of children and adolescents with rheumatological diseases (RD) and their parents during the outbreak. A web-based questionnaire survey was conducted in a cross-sectional design in RD patients and healthy controls. The Hospital Anxiety and Depression Scale was used to evaluate parental psychiatric status; while the State-Trait Anxiety Inventory for Child was used for children. Four hundred and fifty-nine patients with RD and their parents completed the present study, as well as 336 healthy peers. The age and gender of the children were similar across groups. Under 12 years of age, the trait anxiety of the children and the psychological symptoms of parents were similar across groups; while over 13 years of age, anxiety and depression scores of the parents, as well as trait anxiety of the children were higher than the control groups' (7.3 ± 3.4 vs 6.3 ± 3.8, $p = 0.006$ for parental anxiety; 6.6 ± 3.8 vs. 5.3 ± 3.9, $p < 0.001$ for parental depression; 36.1 ± 8.7 vs. 33.3 ± 7.9, $p = 0.002$ for child trait anxiety). In patient group, there were no differences in scale scores according to variables such as rheumatological disease diagnosis, the consulting of doctor for treatment, thinking that RD increases the risk of COVID-19, the history of rheumatic disease attack during the pandemic process, and the use of biological agents. The children's trait anxiety was positively correlated with their parents' anxiety ($r = 0.414$, $p < 0.001$) and depression ($r = 0.300$, $p < 0.001$) scores. These findings suggest that clinicians should pay attention to the psychiatric symptoms of both children with RD and their parents during the pandemic.

Keywords Adolescents · Anxiety · Children · COVID-19 · Depression · Rheumatic diseases · Outbreak

Introduction

Coronavirus Disease (COVID-19) was first identified in Wuhan, China, in late 2019, as a variant of severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) [1, 2]. COVID-19 usually presents with symptoms of fever, dry cough and fatigue; its symptoms ranging from mild to severe, and in some cases becoming fatal [3]. Additionally, symptoms that mimic rheumatological diseases such as myalgia, arthralgia, cytopenia, myocarditis, cytokine storm may also present themselves in the course of the disease [4]. It has also been reported that the risk of mortality increases

✉ Ozgur Kasapcopur
  ozgurkasapcopur@hotmail.com

  Gizem Durcan
  drgizemkaymak@hotmail.com

  Kenan Barut
  drkenanbarut@hotmail.com

  Fatih Haslak
  drfatihhaslak@gmail.com

  Hilal Doktur
  hilaldr2@yahoo.com

  Mehmet Yildiz
  yildizmehmet@istanbul.edu.tr

  Amra Adrovic
  amra.adrovic@istanbul.edu.tr

  Sezgin Sahin
  sezgin@istanbul.edu.tr

1 Department of Child and Adolescent Psychiatry, Neurology
   and Neurosurgery, Bakirkoy Research and Training Hospital
   for Psychiatry, 34147 Istanbul, Turkey

2 Department of Pediatric Rheumatology, Medical Faculty
   of Cerrahpasa, Istanbul University-Cerrahpasa, Istanbul,
   Turkey

in the presence of underlying diseases, secondary infections and high inflammatory indicators [5]. Furthermore, COVID-19 is milder and less common in children than in adults [6, 7].

Direct or indirect exposure to natural disasters and community-based traumatic events cause psychological distress [8]. As such, it is normal for unexpected and uncertain processes to cause anxiety. Child and adolescent mental health are strongly impacted by the family system, and the pandemic process significantly affects family interactions [9]. SARS-CoV-2 may also cause neurological and psychiatric symptoms by affecting the brain [10, 11]. Thus, the impact of the unique and rapid course of the COVID-19 outbreak on various internalization disorders in children and adolescents is still unclear [12].

An epidemiological study on adolescents in China reported increased symptoms of depression and anxiety during the COVID-19 outbreak [13]. However, there are still a limited number of studies on the psychological effects of COVID-19 in children with chronic diseases and their parents. Moreover, there is no consistency in the results of the existing studies [14, 15]. An example for these inconsistencies is that depression and anxiety scores were not found to be different in adult patients with rheumatic disease when compared to teachers and academicians during the COVID-19 outbreak in one study [16].

After detecting the first cases in Turkey, many public and private hospitals were declared "pandemic hospitals" by the government. To treat more COVID-19 patients, routine appointments in outpatient clinics were reduced and non-emergency surgeries were postponed. While these changes in the present health system facilitated the treatment of COVID-19 patients, they caused disruptions in the follow-up and treatment processes of individuals with chronic diseases who need regular follow-ups. Additionally, as we have established that COVID-19 symptoms can mimic rheumatic diseases, it is noteworthy that in the treatment of COVID-19 drugs such as steroids, hydroxychloroquine and other such biological agents, which are used in patients with rheumatic disease, are used as well. Thus, there may be an uncertain and complex relationship between rheumatic diseases and COVID-19 [17–19]. In this study, we aimed to evaluate the psychological symptoms of children and adolescents with rheumatological diseases and their parents during the outbreak.

Materials and methods

Study groups

The target population comprised of children and adolescents aged 2–18 years. Patients who regularly visited the Cerrahpasa Medical Faculty Pediatric Rheumatology Outpatient Clinic for a rheumatological disease formed the patient group. Rheumatological diseases were separated into three subgroups for the purposes of this study; (1) juvenile idiopathic arthritis (JIA); (2) familial Mediterranean fever (FMF); (3) systemic lupus erythematosus (SLE). All the patients fulfilled the "Systemic Lupus International Collaborating Clinics'' classification criteria for SLE [20], Turkish Pediatric FMF criteria for FMF [21], "The International League of Associations for Rheumatology (ILAR)'' criteria for JIA [22] and the diagnosis was made by pediatric rheumatologists. Children and adolescents without chronic diseases who were of similar age and gender, as well as their parents, formed the control group.

Study procedures

A web-based survey was conducted in a cross-sectional design using the Google-Forms platform. A unique link to access the online survey page was provided, and participants were explicitly asked to answer the survey only once. The protocol was approved by the Cerrahpasa Ethics Committee (Decision No: 61911 dated 14.05.2020) and Ministry of Health. The online form was sent out to the parents of participants with a brief description of the study via the phone and e-mail addresses of the outpatient clinic files of 1294 patients. The questionnaire was answered by 520 participants between the 27th of May 2020 and the 30th of June 2020. The response rate was 40.2%. While a certain part of the questionnaire had to be filled out by the parents, 52 patients filled out all parts of the questionnaire themselves. And, 9 patients had a diagnosis other than the 3 specified groups (FMF, JIA and SLE). In total, 61 patients were excluded from the study. Four hundred fifty-nine patients were included in the statistical evaluation. Participants gave their consent to participate in the study by clicking the study link sent to them. The online survey contained three parts. The first part included questions about sociodemographic data in a form prepared by the authors. The second part included the Hospital Anxiety and Depression Scale (HADS) to evaluate parental psychological distress. The third part included the State-Trait Anxiety Inventory for Children (STAI-C). The first and second parts were answered by the parents and the third part by the child.

Measures

Sociodemographic data form

This data form consisted of questions about age, sex, the presence of a COVID-19-positive individual in the family, the suspicion of COVID-19, and the Polymerase Chain Reaction (PCR) result if any such test had been done.

Other questions included whether the child was exposed to COVID-19 news from the media, whether there were increased protective measures for the child, and whether the child was exposed to cigarette smoke. Patients' parents were also asked about their thoughts on the risk of the COVID-19 pandemic related rheumatological diseases (such as the diagnosis and treatment of the child's rheumatological disease, their opinions on the effect of the child's disease and drug treatment on the risk of COVID-19, whether they consulted their doctors of the treatment process, etc.).

The hospital anxiety and depression scale (HADS)

The HADS, which included depression and anxiety subscales, consisted of 14 items. Each item was scored between 0 and 3. Depression and anxiety scores were calculated separately and each ranged from 0 to 21. The cut-off points of the scales were ≥ 11 for anxiety and ≥ 7 for depression. The validity and reliability of the Turkish version of the scale had previously been conducted [23].

The state-trait anxiety inventory for children (STAI-C)

The STAI-C was used as an anxiety measure to evaluate the state and traits of participant anxiety. There were 20 multiple-choice questions for state-trait anxiety. Each item was scored between 1 and 3. Higher scores indicated a higher level of anxiety. The state anxiety section evaluated how individuals felt in the present moment; while the trait anxiety section evaluated how individuals felt in general. Both inventories had been successfully adapted to Turkish by Özusta [24].

Statistical analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) software (version 21.0). Descriptive statistical measures (Frequency, Percentage, Mean, Standard deviation) were examined and the Kolmogorov–Smirnov distribution test was used to examine the normal distribution. Categorical variables were compared using Pearson's Chi-square test and the Fischer's Exact test. Since the data did not yield a normal distribution, the Mann–Whitney U test and the Kruskal–Wallis test were used for group comparisons and Spearman's correlation analysis was used for intercorrelations between continuous parameters. Reliability results equal to or greater than 0.95 were interpreted and a p-value of < 0.05 was considered significant.

Results

Participant characteristics

In total, we examined 795 children and their parents (459 with rheumatologic diseases and 336 healthy controls). Two hundred sixty-four (57.5%) of the patients with the rheumatic disease were followed up with the diagnosis of FMF, 154 (33.6%) with JIA and 41 (8.9%) with the diagnosis of SLE. Two hundred fifty-seven (56%) of the children with rheumatologic diseases and 190 (57%) of the healthy children were female. The mean age of the patients with the rheumatic disease was 10.8 ± 5.7, and the mean age of the control group was 11.3 ± 4.5 years. There were no significant differences in age and gender between the patient and control groups. While the parents who filled the forms in both groups were most frequently mothers, the proportion of fathers who filled the forms in the patient group was higher than the control group.

Comparison of groups in terms of COVID-19 related questions

Parents reported that children in the patient group were less exposed to news relating to COVID-19 ($p = 0.019$). The children who experienced difficulties separating from parents when younger were more often in the patient group than in the control ($p = 0.002$). The results regarding sociodemographic characteristics and the questions regarding the epidemic process are shown in Table 1. Fifteen of the patients with rheumatic disease and four of the control group had known psychiatric diagnosis. The proportion of parents who increased measures to protect their children was similar across groups (92.6% for both groups). While 13 children in the patient group and 14 children in the control group had been referred to the hospital due to suspicions of COVID-19, only two of those in the patient group and three in the control had positive PCR test results.

Comparison of groups in terms of psychological scales

To evaluate the effects of developmental characteristics on children, comparisons of psychological scales were made by dividing children into three groups according to their age: < 8, 8–12 and > 13. There were no significant differences between the parental depression and anxiety scores of those in the patient and in the control groups for the < 8 and 8–12 age groups (for all $p > 0.05$). The depression and anxiety scores of the parents of patients with the rheumatic disease aged > 13 years were significantly higher than the

Table 1 Comparison of patient and control groups in terms of sociodemographic characteristics, COVID-19 risk and problems related to the pandemic process

	Patient group (n = 459)	Control group (n = 336)	P
	Mean ± SD or n (%)		
Childs age (years)	10.8 ± 4.7	11.3 ± 4.5	0.060
Childs sex (F/M)	257/202	190/146	0.876
Who filled out the form?			
Mother	329 (71.7)	275 (81.8)	
Father	127 (27.7)	52 (15.5)	< 0.001
Other	3 (0.7)	9 (2.7)	
Have you used preventive treatment? (such as vitamins)			
Yes	117 (25.5)	85 (25.3)	0.951
No	342 (74.5)	251 (74.7)	
Is your child exposed to cigarette smoke?			
Yes	53 (11.5)	38 (11.3)	0.917
No	406 (84.5)	298 (88.7)	
Do you continue your job?			
Yes	221 (48.1)	215 (64)	< 0.001
No	238 (51.9)	121 (36)	
Has the time you spent with your child increased?			
Yes	307 (66.9)	167 (49.7)	< 0.001
No	152 (33.1)	169 (50.3)	
Anyone in your family diagnosed COVID-19?			
Yes	20 (4.4)	26 (7.7)	0.044
No	439 (95.6)	310 (92.3)	
Are there any health workers in the family?			
Yes	34 (7.4)	38 (11.3)	0.058
No	425 (92.6)	298 (88.7)	
Is your child exposed to news about COVID-19?			
Yes	318 (69.3)	258 (76.8)	0.019
No	141 (30.7)	78 (23.2)	
Have you created a new layout for your child?			
Yes	327 (71.2)	244 (72.6)	0.670
No	132 (28.8)	92 (27.4)	
Does your child have more trouble separating from you than before?			
Yes	94 (20.5)	41 (12.2)	0.002
No	365 (79.5)	295 (87.8)	

control group scores (6.6 ± 3.8 vs. 5.3 ± 3.9, $p < 0.001$ for parental depression and 7.3 ± 3.4 vs. 6.3 ± 3.8, $p = 0.006$ for parental anxiety).

Between the ages of 8 and 12, STAI -C state anxiety scores in patients with a rheumatic disease (32.0 ± 7.3) were significantly higher than the control group scores (29.1 ± 4.5, $p = 0.02$). At the age of > 13, STAI-C trait anxiety scores were significantly higher in patients with the rheumatic disease than in the control group (36.1 ± 8.7 vs. 33.3 ± 7.9; $p = 0.002$) (Table 2).

When evaluated according to sex, there were no significant differences between the patient and control groups in

terms of the parent and child scales for females. However, for males; while the anxiety scores of the parents were similar across groups, the depression scores of the parents of patients were significantly higher than the control group scores (6.4 ± 3.9 vs. 5.5 ± 3.7; $p = 0.036$ for depression). Additionally, for males; child trait anxiety (32.5 ± 7.3 vs. 30.4 ± 4.4; $p = 0.015$) and child state anxiety scores (35.9 ± 8.4 vs. 31.2 ± 7.1; $p < 0.001$) were significantly higher than the control group scores (Table 2).

Comparison of psychological variables according to the types of rheumatic diseases and COVID-19 outbreak-related questions in the patient group

When the patient group was compared according to the types of their rheumatic diseases, no differences were found with the scale scores between the FMF, JIA and SLE groups (Table 3). Four hundred eighteen (91.1%) patients regularly used drugs for their rheumatic diseases. One hundred eighty-seven (40.7%) parents consulted their doctors about follow-ups and treatments during the Covid-19 pandemic process. Three hundred eighty (69.3%) parents thought that their child's rheumatic disease increased the risk of their getting COVID-19. Fifty-nine (12.9%) of the parents reported believing that the drugs they used for rheumatic diseases increased the risk of getting COVID-19, 70 (15.3%) believed they decreased the risk, and 330 (71.9%) believed they made no impact. Two hundred sixty-two (57.1%) parents thought that missing outpatient clinic appointments due to the pandemic were a problem. Thirty-three (7.2%) parents stated that they had problems acquiring their drug supply.

When patients with the rheumatic disease were divided into two groups in terms of these various parameters (i.e., their consulting a doctor about treatment during the outbreak, their thinking that the disease increased their likelihood of getting COVID-19, their thinking that missing a clinic appointment was a problem, the presence of their rheumatic disease-related attacks during the pandemic, and their use of biological agents) no significant differences between groups for all HADS and STAI-C scores were found (Table 4). There were no significant differences in terms of scale scores between male and female patients with rheumatic disease. When the patients were grouped according to 8–12 years and > 13 years old, there were no significant differences between scale scores found ($p > 0.05$ for all).

There were no significant correlations between the ages of the children and the scale scores of the parents and children. There was a moderate positive correlation between the HADS anxiety scores of the parents and the STAI-C state and STAI-C trait scores ($r = 0.313$, $p < 0.001$; $r = 0.414$, $p < 0.001$, respectively). Additionally, there was a moderate

Table 2 Comparison of psychological scale scores of patient and control groups according to age groups and gender

< 8 years	Patient group (n=132)	Control group (n=94)	z	p
HADS-anxiety	7.2 ± 3.8	7.5 ± 3.8	− 0.793	0.428
HADS-depression	6.2 ± 3.8	6.0 ± 3.7	− 0.363	0.716
8–12 years	(n=155)	(n=71)		
HADS-anxiety	7.3 ± 3.8	7.5 ± 4.2	− 0.152	0.879
HADS-depression	6.5 ± 3.8	6.9 ± 4.3	− 0.706	0.480
STAI-C state	32.0 ± 7.3	29.1 ± 4.5	− 2.326	0.02
STAI-C trait	35.5 ± 8.5	34.1 ± 8.0	− 1.297	0.195
≥ 13 years	(n=172)	(n=171)		
HADS-anxiety	7.3 ± 3.4	6.3 ± 3.8	− 2.757	0.006
HADS-depression	6.6 ± 3.8	5.3 ± 3.9	− 3.580	< 0.001
STAI-C state	32.3 ± 7.6	33.1 ± 5.6	− 0.883	0.377
STAI-C trait	36.1 ± 8.7	33.3 ± 7.9	− 3.088	0.002
Female	(n=257)	(n=190)		
HADS-anxiety	7.5 ± 3.7	7.1 ± 4.0	− 1.263	0.207
HADS-depression	6.4 ± 3.8	6.0 ± 4.2	− 1.427	0.154
STAI-C state	32 ± 6.8	32.9 ± 6.2	− 1.061	0.289
STAI-C trait	35.5 ± 8.2	34.9 ± 7.9	− 1.026	0.305
Male	(n=202)	(n=146)		
HADS-anxiety	6.9 ± 3.5	6.6 ± 3.7	− 0.862	0.389
HADS-depression	6.4 ± 3.9	5.5 ± 3.7	− 2.099	0.036
STAI-C state	32.5 ± 7.3	30.4 ± 4.4	− 2.444	0.015
STAI-C trait	35.9 ± 8.4	31.2 ± 7.1	− 4.850	< 0.001

HAD hospital anxiety and depression scale, *STAI-C* state-trait anxiety inventory for children

Table 3 Comparison of psychological scale scores according to the diagnosis of the rheumatology patients

	FMF (n=264)	JIA (n=154)	SLE (n=41)	p
Age	10.2 ± 4.5	10.9 ± 4.9	13.9 ± 4.0	< 0.001
HADS-anxiety	7.3 ± 3.6	7.2 ± 3.7	7.3 ± 3.6	0.877
HADS-depression	6.5 ± 3.8	6.5 ± 3.9	5.7 ± 3.2	0.608
STAI-C state	32.7 ± 7.2	31.7 ± 6.6	31.1 ± 7.3	0.264
STAI-C trait	35.3 ± 8.8	36.1 ± 7.8	36.4 ± 6.2	0.532

HAD hospital anxiety and depression scale, *FMF* familial Mediterranean fever, *JIA* juvenile idiopathic arthritis, *SLE* systemic lupus erythematosus, *STAI-C* state-trait anxiety inventory for children

positive correlation between the HADS depression scores of the parents and the STAI-C state and STAI-C trait scores ($r = 0.367$, $p < 0.001$; $r = 0.300$, $p < 0.001$, respectively) (Table 5).

Discussion

This study showed that, while depression and anxiety scores in the parents of patients with rheumatic disease older than 13 years were higher than that of the control group, there were no differences between the healthy peers in the groups younger than 8 years and between 8 and 12 years. Similarly, the trait anxiety scores of the children who were patients with rheumatic disease older than 13 years were higher than the children who were controls. While psychological scale results were similar across the patient and control groups for female children and their parents, they were significantly higher in the patient group for male children.

Children and adolescents are highly susceptible to the impact of stressors during mentally sensitive developmental periods, and therefore their mental health during and after the pandemic requires special attention [25, 26]. It is known

Table 4 Comparison of psychological scale scores according to COVID-19 risk perceptions of rheumatology patients

	HADS-anxiety	p	HADS-depression	p	STAI-C state	p	STAI-C trait	p
Consulting own doctor about COVID-19								
Yes (n=187)	6.9±3.4	0.094	6.3±3.9	0.574	31.8±6.6	0.284	35.6±7.3	0.837
No (n=272)	7.5±3.8		6.5±3.7		32.6±7.5		35.8±9.0	
Is your child's rheumatological disease a risk for COVID-19?								
Yes (n=318)	7.4±3.7	0.492	6.5±3.8	0.764	32.3±7.4	0.963	35.6±8.6	0.888
No (n=141)	7.1±3.6		6.3±3.8		32.2±6.4		35.8±7.6	
Missing outpatient clinic appointment is a problem?								
Yes (n=262)	7.5±3.7	0.068	6.5±3.6	0.390	31.8±7.3	0.277	36.0±9.1	0.339
No (n=197)	6.9±3.6		6.3±4.0		32.7±6.8		35.3±7.2	
Has the child had an attack during the pandemic process?								
Yes (n=118)	7.5±3.4	0.189	6.7±3.3	0.216	32.2±6.3	0.656	35.4±7.3	0.545
No (n=341)	7.2±3.7		6.3±4.0		32.2±7.4		35.8±8.6	
Does the child use biological agents?								
Yes (n=86)	6.8±3.4	0.213	6.3±4.0	0.580	32.4±6.6	0.992	35.7±7.3	0.808
No (n=371)	7.0±3.7		6.4±3.8		32.2±7.2		35.7±8.5	

HAD hospital anxiety and depression scale, *STAI-C* state-trait anxiety inventory for children

Table 5 Correlation between parent and children's scale scores in the patient group

	HADS-anxiety	HADS-depression	STAI-C state	STAI-C trait
Age	− 0.025	− 0.046	0.024	− 0.032
HADS-anxiety		0.632***	0.313***	0.414***
HADS-depression			0.367***	0.300***
STAI-C state				0.603***
STAI-C trait				

HAD hospital anxiety and depression scale, *STAI-C* state-trait anxiety inventory for children

*P < 0.05

**P < 0.01

***P < 0.001

that negative emotional reactions such as anxiety and depression can be experienced in society during epidemics [27, 28]. In a study conducted on adolescents in China in the early stages of the COVID-19 outbreak, a prevalence of 44% for depressive symptoms and 37% for anxiety symptoms was reported [13]. While there are studies reporting an increase in the prevalence of depression after the pandemic when compared to before [29]; there are also studies reporting that depression and anxiety did not increase [30].

Although there are many studies on the psychological effects of the pandemic upon the general population, including healthcare workers, there are fewer studies on individuals with chronic diseases. Once again, in a population-based study in China during the epidemic period, moderate to severe anxiety was found in one-third of participants, while being a woman and having a chronic disease were associated with more negative psychological effects [31]. With the pandemic process, there have been changes in the health systems of countries, closures of inpatient services, limiting of outpatient services to only accommodate emergencies, and uncertainty has arisen in the follow-up and treatment processes of individuals with chronic illnesses. In studies conducted with children with different rheumatological diseases before the pandemic, no differences were found in terms of depression and anxiety scores when they were compared to healthy children [32–35]. However, we thought that the psychiatric symptoms of parents and children with rheumatic diseases would be greater than healthy individuals, due to COVID-19 symptoms mimicking rheumatological diseases and the complex and unclear relationship that emerged with the introduction of some rheumatology drugs into the treatment of COVID-19. Greater results were found in terms of trait anxiety in children older than 13 years and psychiatric symptoms in their parents in the rheumatology group. However, we found no differences between the patient and control groups of the parents of children older than 8 years and between 8 and 12 years. In the literature, while trait anxiety in the mothers of children with cystic fibrosis was found to

be higher than the control group during the COVID-19 epidemic [15]; depression and anxiety in children with chronic lung disease and their parents were similar to the control group [14]. The fact that healthy children had not experienced a fear of illness before and that their anxiety increased in cases of serious illness risk may be the cause of no differences between healthy and chronic disease groups.

Patients with autoimmune diseases can develop stronger resilience as an adaptive response to the chronicity of their condition [36–38]. Resilience can be defined as a multidimensional structure that explains the long-term positive effects resulting from the ability to adapt to threatening or traumatic experiences [39]. Resilience is strongly negatively correlated with depression and anxiety [38]. In our study, the similarity of depression and anxiety scores between the patient and control groups of children younger than 12 years and their parents may be related to the resilience that develops adaptively to the presence of chronic disease.

At the same time, the cognitive and emotional processing of the subjective experiences of parents and children after medical trauma such as chronic illness and the adaptation potential of families can provide post-traumatic growth [40, 41]. It was found that problem-focused coping strategies were used more with mothers of children with chronic lung disease than with mothers of healthy children [14]. It is natural that an extraordinary and uncertain situation creates anxiety. The psychological response of the child is determined by the level of cognitive development and understanding of the cause of the disaster, as well as the reactions of family members and the child's personality and coping mechanisms [8]. While we did not find a difference in the trait anxiety scores of children between 8 and 12 years of age, we found that adolescents with rheumatologic diseases had higher trait anxiety scores than controls. Adolescents' higher awareness of the risks rheumatological diseases pose towards COVID-19 may have led to the higher anxiety scores of patients over the age of 13 when compared to the control group. The depression and anxiety scores of parents of adolescents with rheumatological diseases were also higher than the control group scores. The desire of adolescents to act more autonomously and the lower parental control in this age group may increase depression and anxiety in the parents in the patient group.

While the psychiatric symptoms of parents of female children were similar across the patient and control groups; for males, both the state and trait anxiety of the children and the depression scores of their parents were higher in the patient group. In community studies during the COVID-19 outbreak, the female gender was associated with higher anxiety in children, adolescents and adults [13, 42]. In our study, the anxiety scores of females were higher when compared to males within the whole sample. However, there were no differences when only the patient group was compared. Thus,

we may extrapolate that the female ability to adapt to chronic illness may be greater than the male.

In our study, when we grouped patients with rheumatic disease as JIA, SLE and FMF, according to their diagnosis, the found scale scores were similar across groups. Similar results have been shown in adult patients with the rheumatic disease [16]. More than half of the parents thought that the child's rheumatological disease increased their risk of getting COVID-19. However, the psychological scale scores of the parents and children did not differ across groups when the parents were grouped according to their thought that the disease increased the risk of getting COVID-19, their consulting their own doctor about their child's treatment, their use of biological agents, and the presence of their illness-related attacks. Caregivers' anxiety and stress may be affected not only by the direct effects of the virus and disease risk but also by other factors such as short and long-term financial problems. The mental processes of both parents and children are affected by factors such as the loss of many activities in the children's lives (e.g. school, extracurricular activities, social interactions, etc.), the reorganizations of their family life, the loss of their support systems, and the families' obligation to inform their children about the epidemic [9, 43]. As parents' own losses (such as work, loved ones in events of death, their own health) increase, their capacity to buffer children's stress decrease and traumatic consequences for children increase [9]. In our study, the depression and anxiety scores of the parents were positively correlated with the anxiety scores of the children. Similarly, in the literature, it has been shown that a mother's depression increases the internalization and externalization problems of their children [44].

In conclusion, the children with rheumatological diseases and their parents were psychologically affected only when older than 13 years of age. Additionally, male patients had higher anxiety scores than their healthy peers. Rheumatological disease diagnosis and disease-related variables had no effect on psychological status.

The limitations of our study can be summarized as follows: First, no data is present regarding the clinical features, biochemical findings and remission status of patients with rheumatic disease. We only asked the participants about the presence of attacks during the COVID-19 pandemic. Although this does not provide all clinical data on disease activation, it may give an indirect idea. Second, we looked at the effects of the presence of rheumatological diseases on psychological status. However, we did not consider factors such as resilience or financial difficulties, that could affect responses to trauma. Since our participants were volunteers, those who were more severely affected by the pandemic may have not participated. We also used self-report scales instead of structured clinical interviews. Furthermore, it is not possible to give causal results, as we did not evaluate the

psychological conditions before the outbreak. The results of our study can only provide an insight into the early phase of the pandemic. Long-term effects may differ. Longitudinal studies are needed to evaluate important factors such as financial problems and resilience, that can affect responses to trauma and coping strategies, to better understand the psychological impact of the outbreak, especially on children with chronic diseases and their parents.

Compliance with ethical standards

Conflict of interest None of the authors of this paper has a conflict of interest, including specific financial interests, relationships and/or affiliations relevant to the subject matter or materials included.

Ethical approval The study was reviewed and approved by the local ethics committee.

References

1. Chan JFW, Yuan S, Kok KH et al (2020) A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. Lancet 395:514–523. https://doi.org/10.1016/S0140-6736(20)30154-9
2. Phelan AL, Katz R, Gostin LO (2020) The novel coronavirus originating in Wuhan. China JAMA 323:709. https://doi.org/10.1001/jama.2020.1097
3. Chen N, Zhou M, Dong X et al (2020) Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet 395:507–513. https://doi.org/10.1016/S0140-6736(20)30211-7
4. Misra DP, Agarwal V, Gasparyan AY, Zimba O (2020) Rheumatologists' perspective on coronavirus disease 19 (COVID-19) and potential therapeutic targets. Clin Rheumatol 39:2055–2062. https://doi.org/10.1007/s10067-020-05073-9
5. Ruan Q, Yang K, Wang W et al (2020) Clinical predictors of mortality due to COVID-19 based on an analysis of data of 150 patients from Wuhan, China. Intensive Care Med 46:846–848. https://doi.org/10.1007/s00134-020-05991-x
6. Ludvigsson JF (2020) Systematic review of COVID-19 in children shows milder cases and a better prognosis than adults. Acta Paediatr 109:1088–1095. https://doi.org/10.1111/apa.15270
7. Çokuğraş H, Önal P (2020) SARS-CoV-2 infection in children. Turk Pediatr Ars. https://doi.org/10.14744/TurkPediatriArs.2020.20270
8. Williams R (2006) The psychosocial consequences for children and young people who are exposed to terrorism, war, conflict and natural disasters. Curr Opin Psychiatry 19:337–349. https://doi.org/10.1097/01.yco.0000228751.85828.c1
9. Courtney D, Watson P, Battaglia M et al (2020) COVID-19 impacts on child and youth anxiety and depression: challenges and opportunities. Can J Psychiatry 65:688–691. https://doi.org/10.1177/0706743720935646
10. Nalleballe K, Reddy Onteddu S, Sharma R et al (2020) Spectrum of neuropsychiatric manifestations in COVID-19. Brain Behav Immun 88:71–74. https://doi.org/10.1016/j.bbi.2020.06.020
11. Troyer EA, Kohn JN, Hong S (2020) Are we facing a crashing wave of neuropsychiatric sequelae of COVID-19? Neuropsychiatric symptoms and potential immunologic mechanisms. Brain Behav Immun 87:34–39. https://doi.org/10.1016/j.bbi.2020.04.027
12. Pfefferbaum B, North CS (2020) Mental health and the Covid-19 pandemic. N Engl J Med 383:510–512. https://doi.org/10.1056/nejmp2008017
13. Zhou SJ, Zhang LG, Wang LL et al (2020) Prevalence and socio-demographic correlates of psychological health problems in Chinese adolescents during the outbreak of COVID-19. Eur Child Adolesc Psychiatry 29:749–758. https://doi.org/10.1007/s00787-020-01541-4
14. Ademhan Tural D, Emiralioglu N, Tural Hesapcioglu S et al (2020) Psychiatric and general health effects of COVID-19 pandemic on children with chronic lung disease and parents' coping styles. Pediatr Pulmonol 55:3579–3586. https://doi.org/10.1002/ppul.25082
15. Pınar Senkalfa B, Sismanlar Eyuboglu T, Aslan AT et al (2020) Effect of the COVID-19 pandemic on anxiety among children with cystic fibrosis and their mothers. Pediatr Pulmonol 55:2128–2134. https://doi.org/10.1002/ppul.24900
16. Seyahi E, Poyraz BC, Sut N et al (2020) The psychological state and changes in the routine of the patients with rheumatic diseases during the coronavirus disease (COVID-19) outbreak in Turkey: a web-based cross-sectional survey. Rheumatol Int 40:1229–1238. https://doi.org/10.1007/s00296-020-04626-0
17. Haşlak F, Yıldız M, Adrovic A et al (2020) Childhood rheumatic diseases and COVID-19 pandemic: an intriguing linkage and a new Horizon. Balkan Med J 37:184–188. https://doi.org/10.4274/balkanmedj.galenos.2020.2020.4.43
18. Kardeş S, Kuzu AS, Pakhchanian H et al (2020) Population-level interst in anti-rheumatic drugs in the COVID-19 era: insights from Google Trends. Clin Rheumatol. https://doi.org/10.1007/s10067-020-05490-w
19. Kardeş S, Kuzu AS, Raiker R et al (2020) Public interest in rheumatic diseases and rheumatologist in the United States during the COVID-19 pandemic: evidence from Google Trends. Rheumatol Int. https://doi.org/10.1007/s00296-020-04728-9
20. Petri M, Orbai AM, Alarcón GS et al (2012) Derivation and validation of the systemic lupus international collaborating clinics classification criteria for systemic lupus erythematosus. Arthritis Rheum 64:2677–2686. https://doi.org/10.1002/art.34473
21. Yalçinkaya F, Özen S, Özçakar ZB et al (2009) A new set of criteria for the diagnosis of familial Mediterranean fever in childhood. Rheumatology 48:395–398. https://doi.org/10.1093/rheumatology/ken509
22. Thomson W, Barrett JH, Donn R et al (2002) Juvenile idiopathic arthritis classified by the ILAR criteria: HLA associations in UK patients. Rheumatology 41:1183–1189. https://doi.org/10.1093/rheumatology/41.10.1183
23. Aydemir Ö, Güvenir T, Küey L, Kültür S (1997) Hastane Anksiyete ve Depresyon Ölçeği Türkçe Formunun Geçerlilik ve Güvenilirlik Çalışması. Türk Psikiyatr Derg 8:280–287

24. Ozusta HS (1995) Standardization, reliability, and validity of the State-Trait Anxiety Inventory in Turkish children. Cocuklar icin durumluk-surekli kaygi Envant yuarlama, gecerlik vs guvenirlik calismasi 10:32–44

25. Fox SE, Levitt P, Nelson CA III (2010) How the timing and quality of early experiences influence the development of brain architecture. Child Dev 81:28–40. https://doi.org/10.1111/j.1467-8624.2009.01380.x

26. Romeo RD (2017) The impact of stress on the structure of the adolescent brain: implications for adolescent mental health. Brain Res 1654:185–191. https://doi.org/10.1016/j.brainres.2016.03.021

27. Liao Q, Cowling BJ, Lam WWT et al (2014) Anxiety, worry and cognitive risk estimate in relation to protective behaviors during the 2009 influenza A/H1N1 pandemic in Hong Kong: ten cross-sectional surveys. BMC Infect Dis 14:1–11. https://doi.org/10.1186/1471-2334-14-169

28. Van Bortel T, Basnayake A, Wurie F et al (2016) Effets psychosociaux d'une flambée de maladie à virus ebola aux échelles individuelle, communautaire et international. Bull World Health Organ 94:210–214. https://doi.org/10.2471/BLT.15.158543

29. Ettman CK, Abdalla SM, Cohen GH et al (2020) Prevalence of depression symptoms in US adults before and during the COVID-19 pandemic. JAMA Netw open 3:e2019686. https://doi.org/10.1001/jamanetworkopen.2020.19686

30. van der Velden PG, Contino C, Das M et al (2020) Anxiety and depression symptoms, and lack of emotional support among the general population before and during the COVID-19 pandemic. A prospective national study on prevalence and risk factors. J Affect Disord 277:540–548. https://doi.org/10.1016/j.jad.2020.08.026

31. Wang C, Pan R, Wan X et al (2020) Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. Int J Environ Res Public Health 17:1729. https://doi.org/10.3390/ijerph17051729

32. Uzuner S, Sahin S, Durcan G et al (2017) The impact of peer victimization and psychological symptoms on quality of life in children and adolescents with systemic lupus erythematosus. Clin Rheumatol 36:1297–1304. https://doi.org/10.1007/s10067-017-3650-5

33. Durcan G, Yildiz M, Kadak MT et al (2020) Increased frequency of sleep problems in children and adolescents with familial Mediterranean fever: the role of anxiety and depression. Int J Rheum Dis 23:1396–1403. https://doi.org/10.1111/1756-185X.13941

34. Tarakci E, Yeldan I, Kaya Mutlu E et al (2011) The relationship between physical activity level, anxiety, depression, and functional ability in children and adolescents with juvenile idiopathic arthritis. Clin Rheumatol 30:1415–1420. https://doi.org/10.1007/s10067-011-1832-0

35. Hanns L, Radziszewska A, Suffield L et al (2020) Association of anxiety with pain and disability but not with increased measures of inflammation in adolescent patients with juvenile idiopathic arthritis. Arthritis Care Res 72:1266–1274. https://doi.org/10.1002/acr.24006

36. Evers AWM, Zautra A, Thieme K (2011) Stress and resilience in rheumatic diseases: a review and glimpse into the future. Nat Rev Rheumatol 7:409–415. https://doi.org/10.1038/nrrheum.2011.80

37. Shaw Y, Bradley M, Zhang C et al (2020) Development of resilience among rheumatoid arthritis patients: a qualitative study. Arthritis Care Res 72:1257–1265. https://doi.org/10.1002/acr.24024

38. Ciaffi J, Brusi V, Lisi L et al (2020) Living with arthritis: a "training camp" for coping with stressful events? A survey on resilience of arthritis patients following the COVID-19 pandemic. Clin Rheumatol 39:3163–3170. https://doi.org/10.1007/s10067-020-05411-x

39. Hornor G (2017) Resilience. J Pediatr Heal Care 31:384–390. https://doi.org/10.1016/j.pedhc.2016.09.005

40. Carona C, Pereira M, Moreira H et al (2013) The disability paradox revisited: quality of life and family caregiving in pediatric cerebral palsy. J Child Fam Stud 22:971–986. https://doi.org/10.1007/s10826-012-9659-0

41. Picoraro JA, Womer JW, Kazak AE, Feudtner C (2014) Posttraumatic growth in parents and pediatric patients. J Palliat Med 17:209–218. https://doi.org/10.1089/jpm.2013.0280

42. Duan L, Shao X, Wang Y et al (2020) An investigation of mental health status of children and adolescents in china during the outbreak of COVID-19. J Affect Disord 275:112–118. https://doi.org/10.1016/j.jad.2020.06.029

43. Fegert JM, Vitiello B, Plener PL, Clemens V (2020) Challenges and burden of the coronavirus 2019 (COVID-19) pandemic for child and adolescent mental health: a narrative review to highlight clinical and research needs in the acute phase and the long return to normality. Child Adolesc Psychiatry Ment Health 14:1–11. https://doi.org/10.1186/s13034-020-00329-3

44. Wachs TD, Black MM, Engle PL (2009) Maternal depression: a global threat to children's health, development, and behavior and to human rights. Child Dev Perspect 3:51–59. https://doi.org/10.1111/j.1750-8606.2008.00077.x