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Original Article

Psychiatric symptoms in children with COVID-19, mothers' psychological resilience and related factors: pandemic hospital inpatient experiences

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ABSTRACT

Background. Information on psychological problems and affecting factors in children hospitalized with the suspicion or diagnosis of COVID-19 is limited. We aimed to screen the psychiatric symptoms of children hospitalized with COVID-19 in Ankara City Children's Hospital and evaluate the caregivers' depression, anxiety, stress, and resilience levels during hospitalization.

Methods. Among the children and adolescents hospitalized in Ankara City Children's Hospital between 1 May 2020 and 31 May 2020 due to the diagnosis of COVID-19, those who agreed to participate in the study were included. The Strengths and Difficulties Questionnaire (SDQ), the Depression Anxiety Stress Scale-21 (DASS-21) scale, and the Brief Resilience Scale (BRS) were used to determine the symptoms.

Results. The mean age of study group (n = 49) was 8.7 ± 5.0 years, 59.2% (n = 29) were girls. The mean children's SDQ-externalizing problems scores were higher in the COVID-19 positive mothers group than the COVID-19 negative mothers' group. The SDQ-total score was positively and strongly correlated with the DASS total score, DASS-depression score, and DASS-anxiety score. BRS scale scores were negatively correlated with the SDQ-total, externalizing, and DASS-21scale scores.

Conclusions. COVID-19 positivity in mothers could be associated with externalizing problems in children. The high resilience of caregivers of inpatients seems to be related to less psychopathology in children. During hospitalization, caregivers' psychological evaluation and psychosocial support may be important for preventive child mental health.

Key words: children, COVID-19, COVID-19 survivors, inpatient, caregivers, resilience.

In December 2019, a novel coronavirus was announced in Wuhan, China. The cause of infection was "severe acute respiratory system corona virus-2 (SARS-CoV-2)", and the disease was "Coronavirus Disease 2019 (COVID-19)". As a result of the rapid spread of the virus all over the World, COVID-19 was declared as a pandemic by the World Health Organization (WHO) on 11 March 2020.[1] COVID-19 infection in children has a milder course, and deaths are rarely reported.[2] This situation causes many children to be considered low-risk groups in terms of infectious diseases in the pandemic. However, in a review discussing the effects of the pandemic on mental health in children, it is recommended that children in the COVID-19 pandemic be considered a sensitive group in terms of mental health problems.[3]

In the literature, most studies on COVID-19 infection and its psychiatric effects are conducted with the adult age group. Preliminary results have shown that COVID-19

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infection is associated with delirium, insomnia, internalizing symptoms, post-traumatic stress symptoms, obsessive-compulsive symptoms[4-6], and in a retrospective cohort study, anxiety and depression were the most common psychiatric symptoms in adult patients with COVID-19.[7] The number of publications on psychological difficulties, especially in children hospitalized with COVID-19, is limited. For prevention, support, and treatment plans for children's mental health problems, it is necessary to increase knowledge on this subject. Our study aimed to screen the psychiatric symptoms of children hospitalized with COVID-19 in Ankara City Children's Hospital and evaluate the depression, anxiety, stress, and resilience levels of the caregivers during hospitalization.

Material and Methods

Children with COVID-19 in inpatient pediatric clinics of Ankara City Children's Hospital in May 2020 were included in this study. Inclusion criteria were; being between 2-17 years of age, having COVID-19 PCR positivity, having a mother as a caregiver, having mothers' capacity to understand and fill in the questionnaires. In addition, sociodemographic form, Strengths and Difficulties Questionnaire-parent form to evaluate children's psychiatric symptoms, Depression Anxiety and Stress Scale to evaluate psychiatric symptoms of mothers, and Brief Resilience Scale to evaluate the resilience of mothers were completed by the mothers.

COVID-19 severity: It is categorized as mild, moderate, and severe illness. Individuals having a mild illness were defined as children who had any of the various signs and symptoms of COVID-19 (e.g., fever, cough, sore throat, malaise, headache, muscle pain, nausea, vomiting, diarrhea, loss of taste and smell) but who did not have shortness of breath, dyspnea, or abnormal chest imaging. Moderate illness: was those with evidence of lower respiratory disease during clinical assessment or imaging and having an oxygen saturation (SpO2) ≥94% on room air at sea level. Severe Illness: Individuals who had SpO2 <94% on room air sea level, a ratio of arterial partial pressure of oxygen to fraction of inspired oxygen (PaO2/FiO2) <300 mm Hg, tachypnea (children younger than two months old≥ 60/minute, 2-12 months old ≥ 50/minute, 12 months-5 years old≥ 40/minute), or lung infiltrates >50%. (https://www.covid19treatmentguidelines.nih.gov/overview/clinical-spectrum/)

Depression, Anxiety and Stress Scale (DASS-21) is a self-report 4-point Likert-type scale from 0 (did not apply to me at all/ never) to 3 (applied to me very much/ always), including three subscales each consisting of 7 items: Depression, Anxiety, and stress.[8] Higher scores indicate more severe emotional distress. The validity and reliability study of the Turkish version of the DASS-21 showed that the scale was a valid and reliable instrument in assessing depression, anxiety, and stress levels.[9]

Strength and Difficulties Questionnaire-Parent form (SDQ-parent) consists of 25 items related to children's social, emotional, and behavioral functioning across five subscales: Conduct Problem, Hyperactivity, Emotional Symptoms, Peer Problems, and Prosocial Behavior.[10] The reliability and validity of the SDQ-parent form were confirmed for the Turkish population.[11]

Brief Resilience Scale (BRS) is a 5-point Likert-type scale, consisting of 6 items; Items 2, 4, and 6 are reversed coded. Higher scores indicate higher levels of psychological resilience.[12] The Turkish version of the BRS has been validated in a Turkish population study.[13]

In May 2020, 505 children with COVID-19 diagnosis or suspicion were hospitalized by the Ankara Board of Infectious Diseases decision. Of them, 279 children had COVID-19 PCR positivity, 49 children and caregivers fulfilled the inclusion criteria and accepted participating in this study. Ethical approval was obtained from the Local Committee of Ankara City Hospital (Ethical ID: E1-20-630). In addition, written consents were obtained from adolescents and caregivers.

Statistical analyses

SPSS 17.0 (Chicago Inc. 2008) program was used for statistical analyses. Continuous variables were defined as mean, standard deviation, minimum-maximum values, and categorical ones as frequency (n) and percentage (%). The Kolmogorov-Smirnov test examined the normality of the continuous variables. For comparisons of the continuous variables, student t-test and Mann Whitney-U tests were used. Categorical variables were compared with Pearson chi-square and Fisher's exact test. SDQ-total scores' correlation analysis with other variables was carried out with Spearman correlation analysis. For the multivariate analysis, the possible factors identified with univariate analysis (p-value < 0.1) or correlated with the dependent variable were further entered into the lineer regression analysis. A multiple linear regression analysis was conducted to determine the effect of independent variables of age, COVID-19 positivity of caregivers, DASS, and BPS scores on the SDQ-externalizing scale score. Multiple linear regression analysis was applied using the "Enter" method. p<0.05 was accepted as significant.

Results

Forty-nine children (29 girls, 59.2%; mean age 8.7 ± 5.0 years (age range: 2-17 years) and mothers were included in the study. All children had mild COVID-19. 87.7% of children had siblings. The rate of COVID-19 positivity in one of the family members was 93.9 (n=46). 53.1% (n=26) of mothers had COVID-19 PCR positivity and received treatment. The study group was grouped according to COVID-19 PCR positivity of caregiver mothers during hospitalization. The median age of COVID-19 positive mothers was lower than the COVID-19 negative mothers (z = -2.090 p = 0.037). The mean age of children were lower in COVID-19 positive mothers than those in COVID-19 negative mothers (respectively $\chi 2$= 5.024 p = 0.02; t= -2.533 p = 0.01). Length of hospital stay of children was similar between groups. There was no history of psychiatric disorders in children, and all were in regular education. Chronic diseases of mothers were diabetes mellitus and hypothyroidism, and mothers' psychiatric diagnoses were anxiety disorders. None of the patients or the parents of the patients needed psychiatric consultation during their hospitalization. There was no death due to COVID-19 in positive family members. Sociodemographic characteristics and risk factors were given in Table I.

When two groups were compared in terms of children's psychiatric scores, only SDQ-parent form externalizing score was significantly higher in children with COVID-19 positive mothers group than negative group (t = 2.029. p = 0.05). There was no difference in the mothers' DASS-21 scores and BRS scores between the two groups (Table II).

Correlation analysis of all groups showed that SDQ total, externalizing and internalizing scores were correlated moderate to low with DASS-21 total, depression, anxiety, and stress scores. There was a low negative correlation between BRS total score and SDQ total, externalizing scores. BRS total scores negatively correlated with DASS-21 anxiety (r = -0.314 p = 0.038), depression (r = -0.586 p <0.001), stress scores (r = -0.565 p <0.001) and total scores (r=-0.518 p <0.001). Also, there was a low negative correlation between SDQ externalizing score and child's age (Table III).

Multiple linear regression analysis revealed that there was only a significant predictive value of DASS-21 total score in terms of SDQ-externalizing subscale scores (F=7.58 p=<0.001 R^2 =0.44) (Table IV).

Discussion

The current study aimed to investigate the psychiatric symptoms among children hospitalized with acute COVID-19. We also aimed to investigate whether the mental health of these children could be associated with COVID-19 infection, psychological status, and resilience of caregiving mothers.

Table I. Characteristics of children with COVID-19 and their mothers.

		Mothers COVID-19 PCR positivity		Statistics	
	Total group n = 49	Positive n = 26	Negative n = 23	t, z or χ^2	p value
Children's					
Age (years)[a]	8.7±5.0 (2 – 17)	7.1±4.1 (2 – 16)	10.6±5.4 (2 – 17)	-2.533	0.01
Gender, n (%)				0.882	0.35
Girls	29 (59.2)	17 (65.4)	12 (52.2)		
Boys	20 (40.8)	9 (34.6)	11 (47.8)		
Chronic disease, n (%)				0.903	1.00
Yes	1 (2.0)	1 (3.8)	0		
Length of hospital stay (days)[a]	10.5±3.8 (5 – 19)	10.2±3.9 (5 – 19)	11.1±3.8 (6 – 19)	-0.782	0.44
Mothers'					
Age (years)b	32 (22 – 45)	29 (22 – 43)	37 (24 – 45)	-2.090	0.03
Chronic disease, n (%)				0.238	1.00
Yes	3 (6.1)	2 (7.7)	1 (4.3)		
Psychiatric disease, n (%)				2.357	0.21
Yes	2 (4.1)	0	2 (8.7)		
Risk factors					
The number of siblings. n (%)				2.487	0.32
None	6 (12.2)	2 (7.7)	4 (17.4)		
Two	18 (36.7)	12 (46.2)	6 (26.1)		
Three	25 (51.0)	12 (46.2)	13 (56.5)		
Four	0	0	0		
Living with elderly (≥60 y) person, n (%)				1.154	0.47
Yes	1 (2.0)	0	1 (4.3)		
Living with a health worker, n (%)				1.154	0.47
Yes	1 (2.0)	0	1 (4.3)		
COVID-19 (+) in other family members, n (%)				3.612	0.09
Yes	46 (93.9)	26 (100.0)	20 (87.0)		

[a]: Mean ± standard deviation (range); b: Median (range); *: Fisher's exact test; NA: not-applicable

The study group consisted of very mild and mild COVID-19 child cases. Similar to our sample COVID-19 infection in children has a milder course, and COVID-19 related deaths in children are reported to be rare at the time of the study.[2] So, patients with more severe illnesses could not be included in the study group. Although children are considered a group at low risk for infectious diseases, it is recommended to consider them a sensitive group in terms of mental health problems in the COVID 19 pandemic[3], particularly children with COVID-19 infection.[4,14]

Children with COVID-19 infection have some challenges during the hospitalization due to separation from the caregiver.[4] Separation from the parents is one of the most severe traumas a child can experience because it may affect their self-regulation and resilience.[15,16] Children were hospitalized without separation from caregivers during COVID-19 isolation in our pediatric clinics. A study reported that separation anxiety and insomnia were the most common mental health problems in hospitalized COVID-19 infected children.[17] Parental mental health problems of children hospitalized with

Table II. Comparing psychological scores of children and mothers between two groups.

	Total group n = 49	Mothers COVID-19 PCR positivity		Statistics	
		Positive n = 26	Negative n = 23	t, z or χ^2	p value
DASS-21[b]					
Total score	7 (0 – 41)	6.5 (0 – 33)	7 (0 – 41)	-0.235	0.81
Depression	1 (0 – 12)	1 (0 – 11)	2 (0 – 12)	-0.163	0.87
Anxiety	2 (0 – 15)	1.5 (0 – 15)	2 (0 – 11)	-0.390	0.69
Stress	2 (0 – 19)	2 (0 – 12)	3 (0 – 19)	-0.011	0.99
SDQ[a]					
Total score	9.8 ± 4.5	10.2 ± 4.8	9.3 ± 4.2	0.810	0.42
Emotional	2.3 ± 1.8	2.2 ± 1.8	2.4 ± 1.8	-0.444	0.65
Conduct	1.2 ± 1.1	1.4 ± 1.2	1.0 ± 0.9	1.761	0.08
Hyperactivity	3.2 ± 2.1	3.7 ± 2.4	2.7 ± 1.8	1.732	0.09
Peer relations	2.9 ± 1.6	2.7 ± 1.6	3.1 ± 1.5	-0.824	0.41
Prosocial	7.9 ± 1.6	7.9 ± 1.9	7.8 ± 1.4	-0.059	0.95
Externalizing	4.5 ± 2.8	5.2 ± 3.1	3.7 ± 2.2	2.029	0.05
Internalizing	5.2 ± 2.7	5.0 ± 2.7	5.5 ± 2.7	-0.787	0.43
BRS-total[a]	21.4 ± 4.8	22.0 ± 4.6	20.9 ± 5.1	0.978	0.33

DASS-21: Depression, Anxiety and Stress Scale; SDQ: Strength and Difficulties Questionnaire; BRS: Brief resilience scale; [a]: Mean ± standard deviation (range); [b]: Median (range)

Table III. Correlation analysis of the SDQ-parent form scale scores with related variables.

		DASS-21 total	DASS-21 depression	DASS-21 anxiety	DASS-21 stress	BRS total	Child's age	Mother's age
SDQ-total	rho	0.551	0.601	0.506	0.516	-0.420	-0.203	-0.154
	p	<0.001	<0.001	<0.001	<0.001	0.004	0.176	0.307
SDQ-externalizing	rho	0.501	0.506	0.458	0.506	-0.329	-0.328	-0.131
	p	0.001	<0.001	0.002	<0.001	0.008	0.026	0.385
SDQ-internalizing	rho	0.403	0.490	0.389	0.340	-0.279	0.069	-0.128
	p	0.07	0.001	0.009	0.024	0.064	0.647	0.395

SDQ: Strength and Difficulties Questionnaire-Parent form, DASS-21: Depression, Anxiety and Stress Scale DASS-S: BRS: Brief Resilience Scale

Table IV. Multiple linear regression analysis of the SDQ-parent form scale external scores with related variables.

SDQ- externalizing	B	SE	B	T	p	95%CI	
						Lower	Upper
DASS-total	0.108	0.044	0.345	2.441	0.019	-0.018	0.193
BRS-total	-0.159	0.086	-0.269	-1.846	0.073	-0.333	0.015
COVID-19 positivity of caregiver	1.576	0.791	0.272	1.992	0.054	-0.026	3.177
Child's Age	-0.109	0.082	-0.175	-1.332	0.191	-0.237	0.057

SDQ: Strength and Difficulties Questionnaire-Parent form, DASS-21: Depression, Anxiety and Stress Scale DASS-S: BRS: Brief Resilience Scale

COVID-19 were more severe, and their anxiety and depression were more evident than other inpatient children's parental mental health problems.[18]

In our study, 53.1% of mothers were COVID-19 positive and received concurrent treatment with their children during hospitalization. COVID-19 positive mothers' depression, anxiety, and stress levels were similar to the COVID-19 negative mothers' group. Additionally, sociodemographic characteristics and risk factors (chronic disease, healthcare worker in the family, family member over 60 years old) were similar. However, children of mothers with COVID-19 were more likely to have externalizing problems. Moreover, the externalizing scores of the children were positively associated with the mothers' depression, anxiety, and stress scores. In previous studies, parents' mental health has been related to hyperactive behaviors in children.[19] A recent online survey study suggested that higher rates of parental psychological distress were associated with higher levels of hyperactivity/ inattention in children. Also, parental verbal hostility positively mediates this association.[20] Elevated maternal distress may increase children's risk of externalizing problems by problems in parenting and child self-regulation.[21] Consistent with our results, parents' concerns about themselves or family members who had the COVID-19 were related to higher levels of children's conduct disorder.[22]

There were no differences in internalizing problems between the two groups in our study. A recent study indicated no difference in anxiety between the groups (COVID-19-positive children with COVID-19-positive parents and the control group). However, COVID-19-negative children separated from their parents due to parents' COVID-19 infection demonstrated higher anxiety levels than the control group. These results show that children's high anxiety levels are associated with separation from parents rather than COVID-19 positivity.[23] In our study, groups had similar internalizing symptoms' levels. This result may be related to not being separated from their parents in both groups. Childhood is more prone to physical, psychological, and social vulnerabilities during an illness than adulthood.[24] Isolation is a significant stressor for children, and isolation may worsen the course of the disease. Separation also increases maternal stress levels, increasing heart rate and cortisol levels. These factors may worsen the disease course of mothers.[25] Within the context of infectious disease pandemics, including the current COVID-19 pandemic, avoiding the separation of parents and hospitalized children has been recommended.[24] Moreover, additional recommendations have been reported on whether a mother is COVID-19-positive or negative.[24] It is a child's right to access their parents during hospitalization, and parents should have access to their hospitalized children. Separation should only occur in exceptional conditions, e.g., if adequate in-hospital facilities do not accommodate the parent and the child together. Both parents should be allowed access to hospitalized children under strict infection prevention and control measures, including handwashing/sanitization, face masks, and physical distancing.[24] Appropriate physical conditions and infection control measures were available for caregivers to accompany children in our children's hospital, so primary caregivers attended hospitalized children in our pediatric infection clinic.

COVID-19 positive mothers' children were younger than COVID-19 negative mothers' children, and there was a negative correlation between child age and externalization problems. In a recent study, young children are more likely to show irritability during the pandemic.[26] Furthermore, being younger was associated with higher hyperactivity/inattention behavior in an online survey study during the COVID-19 lockdown.[20]

Resilience plays an essential role in the response of individuals under pressure and can help them cope with problems more effectively. There was no difference in parental resilience between the groups. However,

there was a negative correlation between children's psychiatric symptoms and mothers' psychological resilience.[27] The psychological resilience of parents affects parenting style, psychological well-being of parents and child-mother interactions.[28] Lower psychological resilience demonstrating poor coping skills might affect the child-mother relationship and parenting style, and so caused children's psychiatric symptoms in our study. In a recent study evaluating psychological resilience in the COVID-19 pandemic, lower resilience scores were associated with more severe depression and anxiety.[29] Considering that lower mothers' resilience was related to higher depression, anxiety, and stress in mothers in our study, this could affect children's mental health.

Our study had some limitations. This study was conducted in a single center with a small sample. Thus, our findings cannot be generalized to other populations. The psychopathology of the adolescents and their mothers could not be evaluated with standardized face-to-face interviews. Psychiatric symptoms other than depression, anxiety, and stress levels of mothers were not assessed in this study. The children's psychiatric assessments depend on only parent-reported, and the duration of hospitalization was not recorded.

In conclusion, our results demonstrate that maternal depression, anxiety, and stress were related to psychological status in children with COVID-19. COVID-19 positive mothers' children have higher externalizing scores than COVID-19 negative mothers' children. Mothers' and children's psychological problems increasing with the lower scores of the mothers' psychological resilience may also indicate the psychosocial support needs of mothers hospitalized with children COVID-19 positive. A larger sample with a longitudinal design may reveal the effects of COVID-19 positivity on caregiver and child psychopathology in the following studies.

Ethical approval

Was obtained from the Local Committee of Ankara City Hospital (Ethical ID: E1-20-630).

Author contribution

The authors confirm contribution to the paper as follows: study conception and design: EÇ, AP, GŞD, ÖŞÜ; data collection: AP, TÖ, BG; analysis and interpretation of results: GŞD, EÇ, EA, ZG; draft manuscript preparation: ÖŞÜ, EÇ, EA. All authors reviewed the results and approved the final version of the manuscript.

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Conflict of interest

The authors declare that there is no conflict of interest.

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