

Impact of the COVID-19 Pandemic on Health-Related Quality of Life and Anxiety in Pediatric Hematology/Oncology Patients: A Single Egyptian Center Experience

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Research

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Abstract

Background: Since the World Health Organization declared coronavirus disease 2019 (COVID-19) pandemic on March 11, 2020, the tremendous strain on ill-prepared healthcare services affected the management of patients suffering from various comorbidities and added to the psychological burden. The study aimed to assess the health-related quality of life (HRQoL) of pediatric Hematology/Oncology patients during the COVID-19 pandemic as a reflection of the quality of health care services and to assess anxiety levels and its impact on HRQoL.

Methods: a cross-sectional study of 292 Egyptian children between 2.5 - 13 years with chronic hematological/oncological disorders categorized as bleeding/coagulation disorders, transfusion-dependent patients, and patients receiving chemotherapy. Validated Arabic versions of Pediatric Quality of Life Inventory 4.0 Generic Core Scale and Spence Children's Anxiety Scale were used for assessment of HRQoL and anxiety, respectively.

Results: the mean age was 8.72 ± 3.66 years, 52.4% were males and 65.4% were transfusion-dependent patients. Almost 60% of children were aware of the pandemic and 60.3% had blood transfusion difficulties. Males had significantly lower anxiety levels than females ($p < 0.001$), and transfusion-dependent patients also had significantly lower anxiety levels than patients receiving chemotherapy ($p < 0.001$). Children who were aware of the COVID-19 pandemic had lower anxiety levels than those who were not ($p = 0.006$), while those suffering from fewer clinic days had higher anxiety levels ($p = 0.02$). Several factors have been shown to affect the HRQoL in the three patients' categories and anxiety significantly reduced the three HRQoL domains ($p < 0.001$). The overall emotional functioning score was better than the physical and social aspects.

Conclusion: This study highlights the effect of the COVID-19 pandemic on the anxiety level and hence the HRQoL of chronic hematological/oncological pediatric patients as a crucial step in guiding policies and interventions to maintain their psychological wellbeing.

Background

Since the declaration of Coronavirus disease 2019 (COVID-19) pandemic by the World Health Organization on March 11, 2020, there has been a massive disruption in global health, social welfare, and economy. ^(1,2) COVID-19 is caused by the Severe Acute Respiratory Syndrome Coronavirus-2 and is highly contagious with high morbidity and mortality rates. ⁽³⁾ Healthcare systems worldwide were not fully prepared for the crisis, which caused a tremendous strain on healthcare services, affecting the course and management of many common illnesses, particularly patients suffering from various comorbidities. ⁽⁴⁾

Following the Centers for Disease Control and Prevention recommendations about social distancing,⁽⁵⁾ several policies have been adopted to balance the delivery of uninterrupted health care services and the risk of COVID-19 exposure. Maintaining blood reserves was an unprecedented challenge as the spread of

COVID-19 had profoundly impacted the number of voluntary blood donations, blood supplies, and blood transfusion management in many centers. ^(6,7) Another emerging problem was medication shortage, which could have a significant effect on patient care. ⁽⁸⁾ All these combined factors could have a great impact on hematology/oncology patients' health-related quality of life.

This global disaster has brought not only the risk of death from the disease itself but also an unbearable psychological burden. ⁽⁹⁾ Pediatric Hematology/Oncology patients experience significant levels of psychological distress, even under normal circumstances. ⁽¹⁰⁻¹³⁾ It is important to understand that worries associated with the pandemic, together with any shortage or delays in life-saving treatments, are expected to elevate anxiety levels in these patients and further affect their quality of life. Furthermore, quarantine and social distancing measures might have unintended consequences on mental health and psychological wellbeing due to changes in social support, financial problems, and alterations of daily routines. ⁽¹⁴⁾

The aim of the current study was to assess the health-related quality of life (HRQoL) of pediatric hematology/oncology patients during the COVID19 pandemic as a reflection of the quality of health care services delivered and to assess anxiety levels and its impact on HRQoL. The null hypothesis was that the quality of healthcare services during COVID-19 and anxiety levels were not associated with HRQoL.

Methods

Study design and setting

The present study was a cross-sectional study assessing HRQoL and anxiety among pediatric hematology/oncology patients during the COVID-19 pandemic. Recruitment of patients was done from May to June 2020 during the peak of the pandemic in Egypt, there was a partial lockdown and travel restrictions. ^(15,16) Prior to the commencement of the study, ethical approval was obtained from the Ethics committee, faculty of medicine, Alexandria University. Parental consent was also secured.

Participants and sampling

A convenience sample of 292 children with chronic hematological/oncological disorders aged between 2.5–13 years attending Alexandria University Children's Hospital (AUCH) with their parents/guardians available were included. Patients were categorized into three main groups according to their disorder:

- Patients with bleeding/coagulation disorders, including thrombophilia, chronic immune thrombocytopenic purpura, inherited thrombocytopenias, hemophilia, and other rare hemostatic disorders.
- Transfusion-dependent patients (\approx monthly transfusions), including thalassemia, aplastic anemia, and inherited bone marrow failure syndromes. The majority had β -thalassemia major.

- Patients receiving chemotherapy, including acute leukemias and hemophagocytic lymphohistiocytosis.

Participants were excluded if they or their parents had a history of psychiatric disorders. Patients suffering from other hematological disorders like sickle cell disease, hereditary spherocytosis who were not on a chronic transfusion regimen or could be followed from home were advised to self-isolate and visit the hospital for emergencies only, thus were not included in the study. The sample size was based on a 95% confidence level to detect the HRQoL similar to estimates reported in a previous study (<https://hqlo.biomedcentral.com/articles/10.1186/s12955-018-0893-z>) among pediatric hematology patients (mean \pm standard deviation (SD) HRQoL = 47.9 ± 38.8). The minimum required sample size was calculated to be 67 (MedCalc Statistical Software version 18.2.1 (MedCalc Software Bvba, Ostend, Belgium; Available from <http://www.medcalc.org>; 2018)).

Data collection

Data were collected using self-administered questionnaires for parents of children visiting the outpatient hematology/oncology clinics at AUCH. The study questionnaire included a section for demographic data and questions about the impact of COVID-19 on the delivery of healthcare services. The second section included two scales for HRQoL and anxiety, respectively. The questionnaires were pilot-tested on 15 children attending the ACUH after obtaining parental consent to ensure the appropriateness of the questions, and their data were not included in the data analysis.

Health-related quality of life scale:

HRQoL was assessed using a validated Arabic version of Parent proxy-report of Pediatric Quality of Life Inventory TM (PedsQL TM 4.0 Generic Core Scales). ^(17, 18) The generic module measures four quality of life domains (physical, social, emotional, and school functioning). The school functioning domain was not used in this study as all schools were temporarily closed due to the COVID-19 pandemic. Physical functioning was measured using eight questions, while both social and emotional functioning were assessed using five questions. All questions were scored on a five-point Likert scale ranging from 0 (Never) to 4 (Almost always).

Reverse-scoring of all items with linear transformation into a 0-100 scale was done. Higher scores reflect better quality of life. Validity and reliability of PedsQL 4.0 Generic Core Scale (parent proxy-report) were demonstrated in different populations, cultures, and languages, including a validated form for Arabic populations. ^(19, 20)

Anxiety scale

Anxiety was assessed using the Arabic version of Spence Children's Anxiety scale (SCAS). ⁽²¹⁾ The preschool (PAS) and parent versions of the scale (SCAS-P) were completed by the caregivers. The preschool anxiety scale ⁽²²⁾ was used to measure anxiety in children aged 2.5–6.9 years. It consists of 28 scored anxiety items; each item is rated on a 5-point scale from 0 (Not at all) to 4 (Very often). On the

other hand, the SCAS-P⁽²³⁾ was used for children aged 7–13 years. It consists of 38 questions assessing anxiety on a four-point Likert scale that ranges from 0 (Never) to 3 (Always). The total anxiety score was calculated by adding scores of all questions to range from minimum (0) to maximum (112–114), with higher scores indicating increased anxiety levels. The validity and reliability of the Spence anxiety scales, as well as its Arabic version, were previously demonstrated in several studies.^(24–26)

Statistical analysis

The independent variables were background factors (age, gender, and medical condition), child anxiety, awareness of the COVID-19 pandemic and problems that occurred due to the pandemic (financial, transportation, admission to hospital, clinic days, medications and investigations problems), while the dependent variables were the three dimensions of HRQoL (physical, social and emotional functioning). Descriptive statistics (frequencies, means, and standard deviations (SD)) were calculated for all variables. Cronbach's alpha was calculated to measure the internal consistency of the scales used. Multivariate Analysis of Variance (MANOVA) was performed to assess the association between the three HRQoL dimensions and different independent variables. Regression coefficients (B), 95% confidence intervals (CI), and model adjusted R² were calculated. Significance was set at a *p*-value < 0.05. Data were analyzed using SPSS statistical software for Windows version 23.

Results

Three hundred and twenty patients were invited to participate, but only 292 children were included (91.3% response rate). Table 1 represents the sample characteristics. Most of the included children were males (52.4%), transfusion-dependent patients (65.4%) with a mean ± SD age = 8.72 ± 3.66 years. The majority of children were aware of the COVID-19 pandemic (59.2%), suffered from financial (77.1%), and blood transfusion difficulties (60.3%) as a result of the pandemic. Mean ± SD anxiety score of the study participants was = 48.61 ± 25.36. Regarding HRQoL, social functioning domain had the highest mean score (74.85 ± 27.38), while physical functioning had the lowest score (55.18 ± 25.68).

Table 1
Sample characteristics

Sample characteristics		n = 292
		mean ± SD
Age		8.72 ± 3.66
Anxiety		48.61 ± 25.36
Health-related quality of life	Physical functioning	55.18 ± 25.68
	Social functioning	74.85 ± 27.38
	Emotional functioning	59.33 ± 27.89
	Total score	64.39 ± 23.16
		n (%)
Gender	Males	153 (52.4%)
	Females	139 (47.6%)
Diagnosis	Bleeding/coagulation disorders	43 (14.7%)
	Transfusion-dependent patients	191 (65.4%)
	Patients receiving chemotherapy	58 (19.9%)
Child aware of the COVID-19 pandemic		173 (59.2%)
Problems due to the COVID-19 pandemic: n (%)	Financial problems	225 (77.1%)
	Transportation problems	145 (49.7%)
	Blood and blood products shortage	176 (60.3%)
	Admission to hospital	55 (18.8%)
	Fewer clinics days	123 (42.1%)
	Medications shortage	47 (16.1%)
	Investigations shortage	30 (10.3%)
n (%): number (percent), SD: standard deviation.		
Cronbach's alpha for items of Spence Anxiety Scale = 0.91. Cronbach's alpha for the total HRQoL items = 0.88, and for items of physical, social, and emotional functioning domains = 0.85, 0.67 and 0.83, respectively.		

Table 2 shows association between anxiety scores and different background and COVID-19 related factors. The adjusted model shows that males had significantly lower anxiety levels than females ($B = -14.50, 95\% = -20.03, -8.97$), and transfusion-dependent patients also had significantly lower anxiety

levels than patients receiving chemotherapy (B = -14.45, 95% CI = -21.94, 6.95). Children who were aware of the seriousness of COVID-19 pandemic had lower anxiety levels than those who were not, while those suffering from fewer clinic days had higher anxiety levels (B = -8.66, 95% CI = -14.86, -2.45, and B = 7.33, 95% CI = 1.22, 13.45, respectively).

Table 2

Association of different sociodemographic and COVID-19 related factors with children's anxiety levels

		Unadjusted model		Adjusted model	
		B (95% CI)	P value	B (95% CI)	P value
Gender (male vs. female)		-14.13 (-19.76, -8.51)	< 0.001*	-14.50 (-20.03, -8.97)	< 0.001*
Age		0.06 (-0.74, 0.86)	0.88	0.53 (-0.30, 1.35)	0.21
Diagnosis	Bleeding/ coagulation disorders	-8.47 (-18.43, 1.50)	0.10	-9.72 (-19.43, 0.007)	0.05
	Transfusion-dependent patients	-9.68 (-17.10, -2.26)	0.01*	-14.45 (-21.94, -6.95)	< 0.001*
	Patients receiving chemotherapy	Reference			
Child aware of the COVID-19 pandemic		-6.21 (-12.12, -0.30)	0.04*	-8.66 (-14.86, -2.45)	0.006*
Financial problems		7.34 (0.43, 14.24)	0.04*	4.74 (-2.12, 11.61)	0.18
Transportation problems		4.12 (-1.71, 9.95)	0.17	0.37 (-5.38, 6.12)	0.90
Blood and blood products shortage		4.56 (-1.40, 10.51)	0.13	4.68 (-1.43, 10.78)	0.13
Admission to hospital problems		6.33 (-1.12, 13.77)	0.10	4.83 (-2.47, 12.12)	0.19
Fewer clinics' days		6.27 (0.39, 12.15)	0.04*	7.33 (1.22, 13.45)	0.02*
Investigations shortage		-5.29 (-14.92, 4.34)	0.28	-4.14 (-13.79, 5.52)	0.40

B: Regression coefficient, CI: Confidence Interval, *statistically significant at p -value < 0.05.Model F: 5.47, Adjusted R²: 0.16, p value < 0.001*

	Unadjusted model		Adjusted model	
	B (95% CI)	P value	B (95% CI)	P value
Medications shortage	-7.67 (-15.58, 0.24)	0.06	-5.35 (-13.51, 2.81)	0.20
B: Regression coefficient, CI: Confidence Interval, *statistically significant at p -value < 0.05.				
Model F: 5.47, Adjusted R ² : 0.16, p value < 0.001*				

Table 3 represents the association of HRQoL domains with different independent variables. Males had significantly lower physical and emotional functioning than females (B = -7.23, 95% CI = -12.97, -1.49 for physical functioning, B = -8.40, 95% CI = -14.33, -2.46 for emotional functioning). Children aware of the COVID-19 pandemic had significantly better social functioning than those who were not (B = 9.06, 95% CI = 2.84, 15.28), while those who had financial problems had significantly lower social functioning (B = -7.60, 95% CI = -14.42, -0.78). Children who had problems getting admitted to the hospital had significantly lower physical and social functioning (B = -11.22, 95% CI = -18.45, -3.99 and B = -9.04, 95% CI = -16.25, -1.83 for physical and social functioning, respectively), and those affected by reduced clinic days had significantly lower social and emotional functioning (B = -9.46, 95% CI = -15.54, -3.39 and B = -7.26, 95% CI = -13.55, -0.96 for social and emotional functioning, respectively). Moreover, children suffering from investigations' shortage had significantly lower emotional functioning (B = -10.43 and 95% CI = -20.29, -0.56). Anxiety significantly reduced the three HRQoL domains (B = -0.36, 95% CI = -0.47, -0.24 for physical functioning, B = -0.45, 95% CI = -0.56, -0.33 for social functioning and B = -0.50, 95% CI = -0.63, -0.38 for emotional functioning).

Table 3
Association of different factors with the three dimensions of HRQoL

	Physical functioning		Social functioning		Emotional functioning		
	B (95% CI)	p-value	B (95% CI)	p-value	B (95% CI)	p-value	
Gender (male vs female)	-7.23 (-12.97, -1.49)	0.01*	-3.78 (-9.50, 1.95)	0.20	-8.40 (-14.33, -2.46)	0.006*	
Age	0.16 (-0.66, 0.97)	0.71	-0.27 (-1.08, 0.55)	0.52	0.18 (-0.67, 1.02)	0.68	
Diagnosis	Bleeding/ coagulation disorders	-9.08 (-18.78, 0.63)	0.07	-3.61 (-13.29, 6.07)	0.46	-2.98 (-13.02, 7.05)	0.56
	Transfusion-dependent patients	0.10 (-7.52, 7.72)	0.98	-3.07 (-10.67, 4.52)	0.43	1.72 (-6.16, 9.60)	0.67
	Patients receiving chemotherapy	Reference category					
Child aware of the COVID-19 pandemic	-1.49 (-7.72, 4.75)	0.64	9.06 (2.84, 15.28)	0.004*	5.56 (-0.89, 12.00)	0.09	
Financial problems	0.22 (-6.62, 7.05)	0.95	-7.60 (-14.42, -0.78)	0.03*	-0.62 (-7.69, 6.45)	0.86	
Transportation problems	-1.15 (-6.83, 4.54)	0.69	-3.20 (-8.86, 2.47)	0.27	-0.40 (-6.27, 5.48)	0.89	
Blood and blood products shortage	-0.56 (-6.64, 5.51)	0.86	4.65 (-1.41, 10.71)	0.13	0.05 (-6.24, 6.33)	0.99	
Admission to hospital problems	-11.22 (-18.45, -3.99)	0.002*	-9.04 (-16.25, -1.83)	0.01*	-3.91 (-11.39, 3.56)	0.30	

B: Regression coefficient, CI: Confidence Interval, *statistically significant at p -value < 0.05.

	Physical functioning		Social functioning		Emotional functioning	
	B (95% CI)	p-value	B (95% CI)	p-value	B (95% CI)	p-value
Fewer clinics' days	-3.75 (-10.86, 2.02)	0.23	-9.46 (-15.54, -3.39)	0.002*	-7.26 (-13.55, -0.96)	0.02*
Investigations shortage	-5.37 (-14.91, 4.17)	0.27	-1.35 (-10.87, 8.16)	0.78	-10.43 (-20.29, -0.56)	0.04*
Medications shortage	-0.63 (-8.59, 7.33)	0.88	-6.34 (-14.28, 1.60)	0.12	-1.94 (-10.17, 6.29)	0.64
Anxiety level	-0.36 (-0.47, -0.24)	< 0.001*	-0.45 (-0.56, -0.33)	< 0.001*	-0.50 (-0.63, -0.38)	< 0.001*
Model F (p value)	6.14 (< 0.001*)		10.08 (< 0.001*)		8.97 (< 0.001*)	
Adjusted R²	0.19		0.29		0.26	

B: Regression coefficient, CI: Confidence Interval, *statistically significant at p -value < 0.05.

Discussion

To our knowledge, the present study was among the first studies to assess the anxiety level and HRQoL of pediatric Hematology/Oncology patients along with anxiety impact on HRQoL during the initial period of the COVID-19 crisis. It included a large number of patients with chronic hematological/oncological diseases, representing a vulnerable population hardly impacted by the restrictions imposed during the pandemic.

There was an increase in anxiety levels in pediatric Hematology/Oncology patients, and levels were significantly higher in patients receiving chemotherapy than transfusion-dependent patients. HRQoL, with its three dimensions, was significantly associated with anxiety levels; thus, the null hypothesis of the study was rejected.

In the present study, the lack of information about the COVID-19 pandemic was significantly associated with increased anxiety levels. Children facing unexpected and unknown events tend to make sense of the situation on their own; they may start having their own beliefs about the virus and blaming themselves for the changes happening around them, which makes them more liable to stress and anxiety. ⁽²⁷⁾ The importance of believes about the current situation was investigated among university students in Jordan,

where they found that students had a false belief about the virus being a result of a global conspiracy, triggering a high level of anxiety. Those beliefs were found to be caused by a lack of accurate information.⁽²⁸⁾ The lack of knowledge effect is not different between young children than older youth; they both need age-appropriate, honest, and reliable information about this pandemic in order to control their anxiety. Information can be provided to them by healthcare professionals, especially mental health services, families, and other significant adults like teachers. Preparing the child in a time of crisis helps decrease the harmful psychological effect of an occurring disaster.⁽²⁹⁾

The emerging pandemic placed a burden on health systems, and an evident shortage could be noticed. It was not possible to maintain all services as usual.⁽³⁰⁾ The current situation imposed a reallocation of resources and staff shortage. Children and their families worried about not getting the appropriate medical care.⁽³¹⁾ This was reflected in our results as anxiety increased with the decrease in the clinics' days.

In the present study, the three dimensions and the total in HRQoL of pediatric Hematology/Oncology patients with decreased. This group of children experiences stress related to their frequent hospital visits, is usually vulnerable to poor social adjustment, usually has problems with peer relations, resulting in poor social skills.⁽¹⁰⁻¹³⁾ COVID-19 crisis resulted in changes in daily routine; instead of going to school, children spend more time in front of screens, sleep less, and are less physically active, which affected their physical functioning.⁽³²⁾ Interestingly, the emotional functioning score was better than the physical and social aspects. This could be explained by the change in the daily routine for the children, being at home with their families for a longer time, not being forced to go to school, avoiding any possibility of bullying or other stressors, and even not going to the hospital frequently, so avoiding getting exposed to stress generated by medical procedures. Another point to be considered is that in our study, the patients' age ranged between 2.5 and 13 years; younger children may not understand the extent of the problem caused by this virus or its implications on life nor the implications for the future, whereas, older children and youth may be all too aware of the damage.^(33,34)

Males had significantly lower physical and emotional functioning than females. This may be because males were over-represented in the bleeding/coagulation disorders category, mainly patients with hemophilia A who require regular plasma or factor replacement therapy; they usually suffer from complications of their disease with an accentuated decrease in their physical functioning. Additionally, the decrease in their emotional functioning can be explained by the cultural difference in gender roles, as in Arabic culture, males - even children - are expected not to express emotions during stressful times and are expected to take more responsibility, which can eventually lead to psychological distress. This was conforming with a study conducted by Hegazy et al⁽³⁵⁾ who found that males experience more pain than females and a study by Liang et al⁽²⁹⁾ who found that men scored higher than women on the negative coping scales. On the other hand, a study done in Egypt found lower quality of life in female gender among children with cancer.⁽³⁶⁾ The comparison between the findings of the current study and previous ones is complicated as older studies were not done in a time of pandemic or a crisis.

Awareness of the COVID-19 pandemic was significantly associated with higher levels of social functioning. It was apparent that providing children with an accurate explanation helped that to keep their social connections without exaggerated fears of getting the virus without feeling worried or guilty. Educating children about the current pandemic can have a beneficial effect on their psychological wellbeing, especially that there is no clarity about how long the current situation will last. ⁽³⁷⁾

Social functioning was negatively associated with the presence of financial problems among patients' families. The distress generated by the financial problems influenced parents-children relationships. Stressed parents find it very difficult to support their children or interact with them properly. ⁽³⁸⁾ There are strong indicators that with the restrictions of movement during the lockdown, there was an increase in the level of domestic violence, child maltreatment, and neglect. During this outbreak, children have also lost social support outside their homes; they lost contact with their peers and other significant protective adults like teachers who may detect signs of abuse or stress. ⁽³⁹⁻⁴¹⁾

Since the start of the pandemic, there was reduced access to health services, fewer clinic days, reduced inpatient services, shortage of medications and investigations. This disruption had a significant impact on the patients' quality of life. Hospital admissions' difficulties were associated with a significant decrease in the levels of physical and social functioning. ⁽⁴²⁾ While fewer clinic days were associated with a decrease in social and emotional functioning sub-scales of HRQoL. Medication shortage was significantly associated with a decrease in the emotional functioning sub-scale. Many patients with cancer were concerned that this shortage in health services will result in not receiving the appropriate help that their medical needs will be marginalized and that health services are prioritizing the COVID 19 patients over other disorders. ⁽⁴³⁾

The anxiety about a poorly known, unexpected pandemic like COVID-19 resulted in a poor quality of life. This can be seen with the significant association between anxiety levels and all HRQoL sub-scales. This association emphasizes the importance of discussing the anxiety generated by the long duration of social isolation imposed on children with preexisting physical illness. Lack of social contact, stressors among the family, and the physical burden of the preexisting hematological disorder all had an adverse psychological impact on children. ⁽⁴⁴⁾

The present study had several points of strength; it was conducted during the peak of the pandemic in Egypt at a time where there were major social restrictions and lockdown, and while little was known about the pandemic impact on the stress levels of people as well as health authorities. Moreover, it included an adequate number of patients from different chronic hematological/oncological diseases, of which health care services have been significantly affected due to the pandemic.

On the other hand, the study had some limitations. First, its cross-sectional design could not lead to confirmation of any association, in addition to convenience sampling, which may reduce representativeness, although it is the most commonly used sampling method in clinical research. ⁽⁴⁵⁾ Second, it did not include a control group of healthy children. Moreover, the heterogeneity of the included

patients made a comparison with historical control difficult. Finally, no parental anxiety assessment was done as the main concern was to focus on the children's condition and to avoid questionnaires that would be too long and tedious; it might have been of value to correlate between children's and parents' anxiety and should be considered in further studies.

Conclusions

The present study demonstrated the degree of anxiety and HRQoL affection during the COVID-19 pandemic in children with chronic hematological/oncological diseases and malignancies. The anxiety score was highest in patients receiving chemotherapy, while the HRQoL was lowest in patients with bleeding/coagulation disorders. These findings help a better understanding of the psychological impact of the pandemic on the studied group as a crucial step in guiding policies and interventions to maintain their psychological wellbeing.

List Of Abbreviations

COVID-19	Coronavirus disease 2019
AUCH	Alexandria University Children's Hospital
B	Regression coefficients
CI	Confidence intervals
HRQoL	Health-related quality of life
MANOVA	Multivariate Analysis of Variance
PAS	preschool anxiety scale
PedsQL4.0	Pediatric Quality of Life Inventory version 4.0
SD	Standard deviation
SCAS	Spence Children's Anxiety scale
SCAS-P	Spence Children's Anxiety scale - parent versions

Declarations

Ethics approval was obtained from the Alexandria University Faculty of Medicine Ethics committee (IRB number: 00012098); the study's approval number: 0304621. This study was performed in line with the principles of the Declaration of Helsinki.

Consent to participate: All patients' parents gave their informed consent prior to participating in the study.

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Availability of data: The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Authors' contributions: All authors contributed to the study conception and design. Eman Hassan collected and analyzed the patient's data, Nourhane Aly made statistical analysis and data interpretation. All authors participated in writing the manuscript. All authors read and approved the final manuscript.

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