

# Mental health of children of health workers during the COVID-19 pandemic: A cross-sectional study

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## Abstract

Children are exposed to large amounts of information and high levels of stress and anxiety from adults around them, the media, and social communication networks during the Covid-19 period. The purpose of this study was to compare the anxiety and depression levels of the children of health workers following the declaration by the World Health Organization (WHO) of Covid-19 as a global pandemic with those of age-matched children of non-health worker parents. This prospective, case-controlled, cross-sectional study was performed between July and September 2020. One hundred forty-six participants were enrolled, 71 children of health worker parents in the study group, and 75 age- and sex-matched children of non-health worker parents in the control group. While no significant difference was determined between the children of health workers and non-health workers in terms of CDI scores, total STAI-C scores were higher among children of health workers ( $70.36 \pm 12.43$ ) than in children of non-health worker parents ( $65.62 \pm 11.83$ ) ( $p = .02$ ). This study shows that since their parents work in intensive and high-risk environments during the Covid-19 pandemic, the children of health workers may be at greater psychological risk than other children.

## Keywords

Anxiety, child, Covid-19, depression, health worker

## Introduction

Coronavirus disease 2019 (COVID-19) is a novel disease that rapidly evolved into a global health problem following its first appearance in the Chinese province of Hubei. The etiological agent responsible for this disease is severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). The disease is highly contagious, and the initial clinical symptoms include fever, dry cough, fatigue, myalgia, and shortness of breath (Chen et al., 2020; Paudel et al., 2020). The Covid-19 pandemic appears likely to cause profound effects in all individuals, particularly adults. COVID-19 is regarded

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as a major threat to health worldwide and to the global economy. It impacts on people's lives by affecting their day-to-day behaviors, causes feelings of panic, anxiety and depression, and generally triggers intense fear (Jiao et al., 2020).

Children are exposed to large amounts of information and high levels of stress and anxiety from adults around them, the media, and social communication networks during the Covid-19 period (Dalton et al., 2020). Children experience fear, uncertainty, and physical and social isolation due to the dramatic effects of the Covid-19 pandemic, and may remain unable to go to school for protracted periods (Jiao et al., 2020; Liu et al., 2020). Changes in normal living conditions emerging during phenomena such as the Covid-19 pandemic (quarantine, isolation from friends, loss of a parent, or separation from parents) propel children toward a crisis state and exacerbate the risk of psychiatric disturbance (Liu et al., 2020; Norredam et al., 2018).

Work stress is defined as an individual's response to features of the workplace that are perceived as mentally and physically threatening (Lu et al., 2017). Prolonged work stress can reduce the individual's productivity and adversely affect health, family and social life. Health workers are members of one of the most stressful professions. High work-related stress among healthcare workers can adversely impact on their families and children by reducing overall quality of life (Koinis et al., 2015). Disruptions to fulfilling parenting responsibilities among healthcare professionals due to increased work stress and workload may also affect the mental health of their children (Solantaus et al., 2004).

Health workers are experiencing unprecedented fatigue during to intensive workloads and increased health risks during the pandemic, and this is leading to their own children's psychological needs not being realized or addressed (World Health Organization, 2020). Although the majority of children have been affected by this situation to some extent, it is still unclear which children are most affected. However, since the children of health workers are more aware of what is happening around them and may also be more affected by the difficulties experienced by their parents, they may be expected to have a greater risk of being impacted.

We encountered no previous studies specifically examining mental problems in the children of health workers during the Covid-19 pandemic. The purpose of this study was to assess the levels of anxiety and depression of children of health workers following the declaration of Covid-19 as a global pandemic by the World Health Organization (WHO) by comparing these with age-matched children of non-health worker parents.

## **Methods**

### *Study design and study population*

This case-controlled, cross-sectional study was performed between July and September 2020. Due to the Covid-19 pandemic, a virtual questionnaire was applied to the participants via Google Forms.

### *Procedure*

Children who were Turkish citizens and consenting, together with their parents, to take part in the study, completed the questionnaire by clicking on the link sent to their parents' phones. Participants were required to respond to a yes-no question to confirm voluntary participation, in the form of consent among parents and assent among children. Following that confirmation, participants were asked to complete a self-report questionnaire.

Although the questionnaire was distributed to local residents of Adiyaman province, the study population was not limited solely to individuals resident in that province. Children living in 19

different provinces of Turkey, assenting to take part and whose parents also gave consent, and completing the questionnaire were also included in the study. Inclusion criteria for the study group were age between nine and 18 years, and that one or both of the parents be a health worker (doctor, female nurse, or male nurse). The control group consisted of children of non-health workers, matched to the study group in terms of age and sex, describing themselves as healthy. The participants were recruited using the snowball sampling method. Patients aged under nine or over 17, with Covid-19 positivity, histories of chronic disease, malignancy, or psychiatric disease, or who had recently lost a parent were excluded from the study. Children with a parent who had lost his job and children of divorced parents were also excluded.

## Measures

The questionnaire consisted of three sections, one investigating demographic data, an anxiety scale (state and trait), and a depression scale for children. The demographic variables included age, gender, weight, height, school attendance, parental smoking status, household income, how information about Covid-19 was generally obtained, and current place of residence. Household income was divided into three categories, with a national poverty line of 2825 Turkish lira (nearly \$350) as a threshold value. Households with an income below this value were classified as low-income, those with an income up to double this value as middle-income, and those with an income above that level as high-income.

*Children's depression inventory (CDI).* This is a 27-item self-report scale designed to evaluate the severity of depressive symptoms in children and adolescents (Kovacs, 1985). It has been shown to exhibit satisfactory reliability and validity. The Cronbach  $\alpha$  value of internal consistency is 0.77, and test-retest reliability is 0.80 in the Turkish population (Öy, 1991). In general terms, total CDI scores of 19 or above can be regarded as indicating possession of clinical depressive symptoms, scores of 12–18 indicate subclinical depression, and scores of 12 or less are regarded as normal. A CDI cut-off value of 19 or above was adopted as indicating the presence of clinical depressive symptoms.

*The state-trait anxiety inventory for children (STAI-C).* This scale is an anxiety measurement tool used to evaluate the state and characteristics of anxiety in children aged nine or older. It contains two separate scales for measuring the concept of state and trait anxiety. The state scale, measuring transitory anxiety, consists of 20 items inquiring into how children feel at the present moment. The trait anxiety scale consists of 20 items investigating how children feel generally. This measures relatively stable individual differences in the tendency to anxiety. The items are evaluated on a three-point scale – almost never, sometimes, or generally (Spielberger et al., 1973). The reliability and validity of the Turkish language version have been confirmed. The internal consistency coefficient of the scale was 0.82 for the state anxiety scale, 0.81 for the trait anxiety scale, and test-retest reliability was 0.60 for the state anxiety scale and 0.65 for the trait anxiety scale (Özusta, 1995).

Since the Covid-19 pandemic is a novel phenomenon, children's state and trait anxiety levels were measured using the STAI-C state scale. All data obtained from children and parents were compared between the study and control groups.

## Statistical analysis

Data analysis was performed on Statistical Package for Social Sciences (SPSS) version 22.0. Continuous variables were expressed as mean  $\pm$  standard deviation (SD) and categorical variables as proportion and percentage values. The chi-square test and Fisher's exact test were used in the

**Table 1.** Demographic data for the study and control groups.

Parameter	Study group N (71)	Control group N (75)	p Value
Age (years)	11.18 ± 2.02	11.41 ± 2.21	.514
Weight (kg)	42.5 ± 10.9	39.28 ± 9.65	.054
Height (cm)	147.36 ± 14.5	146.9 ± 16.15	.859
BMI	19.26 ± 3.05	18.33 ± 3.87	.121
Number of siblings	1.75 ± 0.96	1.77 ± 0.89	.862
<b>Household income</b>			<.001*
Low	0	30	
Middle	38	22	
High	33	23	

Note. Student's t test. BMI=body mass index.

\*Chi square test

analysis of categorical variables, and Spearman's correlation analysis to determine correlations. The independent t test was applied to normally distributed parametric variables, and Pearson's correlation analysis was used to determine correlations. Non-normally distributed data were analyzed using the Mann-Whitney U test. *p*-values < .05 were regarded as statistically significant.

### Ethical approval

This study was approved by the institutional review board at the Adiyaman University School of Medicine and was conducted in accordance with the Declaration of Helsinki (approval number 2020/5-26).

### Results

The study group consisted of 71 children of health workers, 26 (36.6%) boys and 45 (63.4%) girls. The control group consisted of 75 healthy children of non-health worker parents, matched to the study group in terms of age and gender, 35 (46.7%) boys and 40 (53.3%) girls. The total study population was 146 participants. There was no statistically significant gender difference between the two groups (*p* = .243). Detailed demographic data for the study and control groups are shown in Table 1.

Analysis of the two groups together showed that 69.2% of children had gained weight, while 10.3% had lost weight. No change in weight was observed in the remaining 20.5%.

Both parents of 20 participants were health workers. In the remaining 51 cases, either the mother or the father was a health worker. Seventeen of the health worker mothers were doctors and 29 were nurses, while 35 fathers were doctors and 10 were male nurses. Twenty-nine of the health worker parents in the study group were actively working on the pandemic ward and were not living at home. Data concerning the anxiety and depression scales for the study and control groups are shown in Table 2.

Depression scores were above the threshold value in 11 patients from the study group and seven from the control group. No significant difference was determined between the groups in terms of the presence of depression (*p* = .318). When all the children were evaluated together, 18 (12.3%) were found to have CDI scores indicating clinical depression.

Data for anxiety and depression levels when the children of health workers were classified depending on whether or not their parents worked on the pandemic ward are shown in Table 3.

**Table 2.** CDI, STAI-trait, STAI-state and STAI-C scores in the study groups.

Parameter	Study group N (71)	Control group N (75)	p Value
CDI	9.8 ± 7.78	8.5 ± 6.35	.502 <sup>+</sup>
STAI-trait	37.02 ± 6.95	33.97 ± 6.19	.006*
STAI-state	33.33 ± 7.12	31.65 ± 6.97	.151*
STAI-C total score	70.36 ± 12.43	65.62 ± 11.83	.020*

Note. CDI= children's depression inventory; STAI-C=state-trait anxiety inventory for children.

\*Student's *t* test.

<sup>+</sup>Mann Whitney *U*.

**Table 3.** Depression and anxiety scores for the children of health workers parents working on the pandemic ward and those of other health workers.

Parameter	Pandemic group N (29)	Non-pandemic group N (42)	p Value
CDI	10.62 ± 9.67	9.23 ± 6.22	.594*
STAI-trait score	37.82 ± 7.46	36.47 ± 6.62	.425 <sup>+</sup>
STAI-state score	34.24 ± 8.91	32.71 ± 5.61	.755*
STAI-C total score	72.06 ± 14.76	69.19 ± 10.57	.341 <sup>+</sup>

Note. CDI= children's depression inventory; STAI-C=state-trait anxiety inventory for children.

\*Student's *t* test.

<sup>+</sup>Mann-Whitney *U* test.

ANOVA and post-hoc tests revealed significant differences in terms of CDI scores between the different maternal occupations ( $p < .001$ ). These particularly derived from differences between doctor and teacher mothers ( $p < .001$ ) and between doctor and clerical worker mothers ( $p = .045$ ). A significant difference was observed between the study groups in terms of total anxiety scores ( $p = .010$ ). This difference derived from the difference between doctor and teacher mothers ( $p = .025$ ). A significant difference was also observed between the groups in terms of STAI-T ( $p = .016$ ). This difference was most marked between doctor and teacher mothers ( $p = .031$ ). There was no significant difference in STAI-S between the groups ( $p = .051$ ).

CDI scores were significantly higher in children with two health worker parents compared to those with non-health worker parents ( $p = .049$ ). No significant differences were observed in STAI-S, STAI-T, or STAI-C scores ( $p = .057$ ,  $p = .302$ , and  $p = .095$ , respectively).

No statistically significant correlation was determined between household income and CDI, STAI-S, STAI-T, or STAI-C scores ( $r = -0.074$   $p = .377$ ;  $r = -.019$   $p = .823$ ;  $r = -.011$   $p = .892$ ; and  $r = -.003$   $p = .976$ , respectively).

The groups also differed significantly in terms of how children acquired their information concerning coronavirus ( $p < .001$ ). Analysis showed that 53.5% of children of health workers acquired their knowledge of coronavirus from their parents, 35.2% from the television, and 11.3% from the internet. In contrast, 76% of children of non-health worker parents acquired their information about coronavirus from the television, 12% from their parents, and 12% from the internet.

## Discussion

The most important finding of this study investigating the psychological effects of the Covid-19 pandemic on the children of health workers was that these had significantly higher levels of anxiety compared to other children. The present study is the first in this field, and therefore of particular importance.

A potentially more important impact of Covid-19, but one that can be easily neglected, is its psychological effect on children. Prolongation of the pandemic period has been reported to be capable of causing severe and permanent effects on mental health, such as fear of contracting the infection, distress and disappointment, insufficient knowledge, lack of face-to-face contact with friends and teachers under quarantine conditions, lack of personal space in the home, and stresses such as financial losses in the family (Brooks et al., 2020; Wang et al., 2020). We think that the elevation in anxiety levels among the children of health workers in this study may be associated with a fear of losing or being separated from a parent, and with a fear of the parent or the child himself contracting the infection.

A systematic review examining the relationship between household income and anxiety in children also reported higher anxiety and depression in children with low socioeconomic levels (Reiss, 2013). Another study reported that a low socioeconomic level was associated with high anxiety levels (Zhu et al., 2019). In contrast to those studies, no significant relationship was determined in the present study between household income and levels of depression and anxiety. This may be a reflection of the fact that the pandemic has adversely affected all sections of society, albeit at different levels, in socioeconomic and psychosocial terms.

One study of health workers in a tertiary Covid-19 hospital in China reported high levels of anxiety and stress disorder, with nurses experiencing higher levels of anxiety than doctors (Huang et al., 2020). In a study from Turkey, Yildirim et al. (2020) reported higher anxiety scores among female health workers than males. In the present study, higher anxiety and depression scores were observed in the children of female doctors.

One previous study reported that isolation of health workers from their families, changes in routine, and contraction of social support networks during the Covid-19 pandemic can all give rise to mental problems. That study also reported that various psychological effects can be seen, such as feelings of solitude, despair, stress, irritability, physical and mental fatigue, and hopelessness (Huang et al., 2020). The anxiety scale score elevation in the children of health workers in the present study may be due to health worker parents being unable to devote sufficient time to their families, to their being anxious over changes in daily life, and to possession of depressive symptoms. High depression scores were also determined in children whose parents were both health workers in the present study. This may derive from fear of both parents falling ill and being separated from both.

This study has several limitations. First, the snowball sampling technique employed may result in a less representative study population and reduce the generalizability of the research. One of the most important limitations of this study was its a cross-sectional nature. Another important limitation is that maternal and paternal anxiety and depression levels were not measured. Examination of anxiety and depression levels in parents and children, and the relationships between them, in future studies may yield useful data. Another limitation may be the low patient number. However, this may be associated with health workers being extremely occupied because of the pandemic and to their children being unable to devote sufficient time to take part in the study.

The present study shows the effects of Covid-19 on a small sample of children from one area. The study findings appear to suggest that the psychological effects of the Covid-19 pandemic on the children of health workers may differ from those on other children. We think that it will be beneficial for greater attention to be paid to the children of health workers and for psychosocial support to be provided for these, in both familial and social terms, at times when health workers are obliged to work under particular scrutiny, such as during the Covid-19 pandemic. Further study is now required on this subject.

## Author Contributions

H. Almis: project development, data collection, and manuscript writing. B. Han Almis: Data analysis and manuscript writing. IH. Bucak: manuscript writing/editing.

## Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Ethical information

The study was approved by the Adiyaman University ethical committee and was conducted in compliance with the Declaration of Helsinki (approval number 2020/5-26).

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