

A Cross-Sectional Study on Behavioural and Psychosocial Impact of COVID-19 Pandemic on Children of Medical Health Care Workers

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Abstract

Background: COVID-19 pandemic has adversely affected children's behaviour and psychological development by disrupting routine life activities. Children of healthcare workers were at an increased risk of anxiety and depression due to prolonged working hours and quarantine of parents.

Aim & Objectives: To study the psychosocial impact of COVID19 on children of health care workers by evaluating anxiety, aggression, and depression.

Material & Methods: An institutional based cross-sectional study was conducted on 200 children of healthcare workers, aged 8 to 16 years in Dr. Shushila Tiwari hospital Nainital. A pre-formed questionnaire using standard scales, including demographic data and behavior changes, described in terms of anxiety, depression, and aggression was filled for each child in detail. Data was tabulated and subjected to statistical analysis.

Results: The study population comprised of 51% females and 49% males. The mean age of children included in the study was 11.27±2.87 years. Statistically significant increase in screen time and sleep duration and decrease in outdoor activity in post-covid period was observed in this study ($p < 0.0001$). 3% children exhibited verbal aggression, 4.5% exhibited physical aggression and 2% showed auto-aggression in the post-covid period. 3% exhibited aggression against property ($p < 0.05$) Depression was observed in 17% children after pandemic ($p = 0.0001$). Generalized anxiety disorder, significant school avoidance, social anxiety disorder and separation anxiety disorder were noted in 2%, 10%, 12.5% and 11.5% children respectively in the post-covid period ($p < 0.05$).

Conclusion: COVID-19 pandemic posed unprecedented challenges to healthcare workers worldwide, producing a substantial psychosocial impact on their children. Attention must be paid to need of psychological support and counselling services to this group of children (COVID BABIES).

Keywords: Health workers, Screen time, Sleep duration, Outdoor activity, Aggression, Depression, Anxiety.

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Introduction

The COVID-19 pandemic, also known as the coronavirus pandemic, is a global pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The World Health Organization (WHO) declared the outbreak a public health emergency of international concern on 30 January 2020. As of 16 March 2023, according to Indian government figures, India has the second-highest number of confirmed COVID-19 cases in the world (after the United States of America) with 44,691,956 [1]. The first cases of COVID-19 in India were reported on 30 January 2020 in three towns of Kerala, among three Indian medical students who had returned from Wuhan, the epicenter of the pandemic. [2-4]. A second wave beginning in March 2021 was much more devastating than the first, with shortages of vaccines, hospital beds, oxygen cylinders and other medical supplies in parts of the country [5]. On 30 April 2021, it became the first country to report over 400,000 new cases in a 24-hour period. [6,7]. By 23 December 2021, India had 78,190 active cases which was lowest in 573 days. [8] This number fell to 21,530 in March 2022. [9].

This COVID-19 pandemic has produced bigger impacts on general health and child development through exposure to the virus and consequent infection, as well as through the social confinement recommended or mandated in an attempt to slow the progress of COVID-19, enable adequate medical care and prevent the collapse of health care systems. [10] Children of front-line health care workers (HCW) being taken care of by their grandparents or relatives are subjected to

separation anxiety and excessive worrying. Quarantined children suffering from the disease or institutional children away from their family and siblings are likely to have adverse psychological effects. Those who have lost their parents to disease and are staying in foster homes, suffer grief, loneliness, adversity, and are quite susceptible to developing posttraumatic stress disorder. [11]

At the same time, children are exposed to social media and gruesome pictures of disease and death may overwhelm them with fear, anxiety, clinginess, inattention, and irritability. [12] During adverse childhood events (ACE's), the body's natural stress response may become dysregulated (toxic stress) leading to persistent elevation of cortisol and proinflammatory cytokines and predisposing children to negative health outcomes later in adult life. This stress can cause delay in cognitive development, somatic complaints, obesity, asthma, diabetes, recurrent infections, sleep disturbance, and even premature death. [13]

Other pertinent problems during these times are closure of schools, social distancing, lack of physical exercise, and outdoor activities. The electronic media did come to their rescue during home confinement but not without its own drawbacks. A few vulnerable ones may fall prey to the Internet and cell phone addiction and have difficulty readapting after the crisis passes. [14]

The stress of the parents who have lost their jobs directly affects children. The incidence of child abuse has increased while access to the support system has

decreased because of the lockdown. The tendency to argue, addiction, self-harming activities, and even suicidal tendency may be seen to an extreme. [15]

There is paucity of data regarding the psychosocial impact of COVID-19 on children of health care workers in India. Hence, the present study was planned to evaluate the behavioral abnormalities in children of healthcare workers during COVID-19 pandemic focusing on anxiety, aggression and depression.

Material and Methods

An institutional based cross-sectional study done from January 2021 to September 2022 for a period of 21 months during covid era in school going children aged 8- 16 years, of health care workers, of Dr Susheela Tiwari hospital Haldwani. Our aim was to study behavioural abnormality in children during COVID-19 pandemic.

Children, who has any cognitive delay or any behavioural abnormality or on treatment for same or have any sleep disorders were not included in this study.

As our hospital was a dedicated Covid hospital since March 2020, all health care workers and their families were at high risk of infection. Children were confined to homes due to closure of school. As their parents were working in hospital, so there could be psychosocial impact in such children.

- We filled all demographic data in our proforma including age, gender, complete address, phone number, class in which child was studying, number of siblings, parent who was health care worker, parent tested positive or not, child self-positive for covid 19 and whether quarantine was done or not.
- We also noted down details of weight in pre-covid time and post-covid time. Activities of children including use of electrical devices like mobile, TV, laptop, video games, duration of use of

screen time, change in duration of sleep hours, morning awakening time, escape of breakfast and duration of outdoor activities were recorded in proforma both for pre-covid and post-covid period.

- Behavior changes were described in terms of anxiety, depression, and aggression. This was based on preformed questionnaire taking standard scale The Modified Overt Aggression Scale (MOAS) for aggression, Patient Health Questionnaire (PHQ9) scale for depression, screen for child anxiety related disorders (SCARED).
- Aggression was studied under the category's verbal aggression, aggression against property, autoaggression and physical aggression.
- Depression was classified as mild moderate and severe.
- Anxiety was studied under categories: Separation anxiety disorder, social anxiety disorder, significant school avoidance, panic disorder and generalized anxiety disorder.
- All the data was tabulated and subjected to statistical analysis.

Results

• Sample characteristics

- In this study, majority of participants (48%) were in the age group of 8-10 years, followed by 27.1% in age group 11-13 years and 24.9% in age group 14-16 years. The mean age of study participants was 11.27 ± 2.87 years which is comprised of 51.0% females and 49.0% males. 66.5% of study participants mothers were employed as the healthcare worker, 27.5% were father and remaining 6% study participants had both mother and father employed as healthcare workers in the medical college. 48% study participants were contact positive for COVID-19. Remaining 52% had no history of contact with COVID-19 positive

parents. Out of 200 study participants, 11% were infected with COVID-19

during the course of the study.

Table 1: Sample characteristic frequency percentage

Age		
8-10yrs	90	48%
11-13yrs	15	27.10%
14-16yrs	58	24.90%
Gender		
Male	98	49%
Female	102	51%
Health care worker (HCW)		
Both	12	16%
Father	55	27.5%
Mother	133	66.5%
Covid positive		
No	104	52%
Yes	96	48%
Self-positive		
No	178	89%
Yes	22	11%

Result Analysis

Table 2: Analysis of behavioural abnormality

	Frequency	Pre-covid		COVID	
		Percent	Frequency	Percent	p-value
Missed breakfast					
No	198	99%	168	84%	
Yes	2	1%	32	16%	0.001
Morning awakening					
5-7 am	182	91%	75	37.5%	
8-10 am	18	9%	112	56%	
After 10am	0	0.0%	13	6.5%	0.001
	Mean	Std. deviation	Mean	Std. deviation	
Weight	33.52 kg	11.88	33.06kg	11.7	0.001
Screen time	3.13hrs	1.65	5.56hrs	2.55	0.001
Sleep duration	8.20hrs	0.79	8.76hrs	1.05	0.001
Outdoor activity	2.46 hrs	0.98	1.08 hrs	1.38	0.001

Missed Breakfast was compared between Pre-Covid and Covid using the Chi-square test and observed that only 1% study participants had habit of missing breakfast in the pre-covid time, whereas 16.0% study participants reported to have this habit in the covid time increased significantly from Pre-Covid to Covid. We

also observed that in the pre-covid time, 91% study participants woke up between 5 AM to 7 AM in morning and only remaining 9% woke up between 8 AM to 10 AM. 0% participant woke up after 10 AM in the pre-covid time. On the other hand, it was observed that in covid time, 56.0% study participants woke up between

8 AM to 10 AM, 37.5% between 5 AM to 7 AM and 6.5% after 10 AM. Thus, it can be inferred that a trend of rising late was seen in the covid times.

The mean weight in pre-covid time was 33.52 ± 11.88 kg, which increased to 35.06 ± 11.78 kg in the covid time. This was found to be statistically significant ($p < 0.05$). Mean sleep duration in pre-covid time was 8.20 ± 0.79 hours, which increased to 8.76 ± 1.05 hours in the covid time. This was found to be statistically significant ($p < 0.05$).

The mean screen time in pre-covid time was 3.13 ± 1.65 hours, which increased to 5.56 ± 2.55 hours in the covid time. This was found to be statistically significant ($p < 0.05$). The mean outdoor activity in pre-covid time was 2.46 ± 0.98 hours, which decreased to 1.08 ± 1.08 hours in the covid time. This was also found to be statistically significant ($p < 0.05$).

Results analysis in terms of Aggression depression and anxiety.

Aggression analysis

Aggression was compared Pre-Covid and Covid time. We observed that pre-covid

time 0.5% of study participants exhibited verbal aggression whereas during Covid time 14.5%, 3%, 2%, 4.5% exhibited verbal aggression, against property aggression, auto-aggression, physical aggression respectively which was 0% among study participants during pre-covid which increased significantly from Pre-Covid to Covid. Physical aggression was found statistically significantly more among males compared to females. ($p < 0.05$). Out of those having physical aggression was statistically significantly more among Covid self-positive.

Depression analysis

In our study, 17% study participants showed signs of depression which included 13.5% mild depression and 3.5% moderate depression in the covid period. This was found to be statistically significant on comparison with pre-covid period ($p < 0.05$). No severe depression was seen. depression was found significantly more in females ($p < 0.05$). Moderate Depression was statistically significantly more among Covid self-positive.

Table 3: Analysis of Aggression, Depression and anxiety.

Pre COVID		COVID		Gender			Self-Positive		
	Number (%)	Number (%)	P-value	Male	Female	P-value	Yes	No	p-value
Aggression									
Verbal	1(0.5%)	29(14.5%)	0.001	18(18.4%)	11(10.8%)	0.128	6(27.3%)	23(12.9%)	0.047
Against	0(0%)	6(3%)	0.013	4(4.1%)	2(2%)	0.379	1(4.5%)	5(2.8%)	0.652
Auto aggression	0(0%)	4(2%)	0.044	3(3.1%)	1(1%)	0.293	1(4.5%)	3(1.7%)	0.366
Physical aggression	0(0%)	9(4.5%)	0.002	9(9.2%)	0(0.0%)	0.002*	2(9.1%)	7(3.9%)	0.027*
Depression									
Mild	0(0%)	27(13.5%)	0.001	9(9.2%)	18(17.6%)	0.039	1(4.5%)	26(14.6%)	0.047*
Moderate	0(0%)	7(3.5%)	0.001	6(6.1%)	1(1.0%)		0(0%)	7(3.9%)	
Anxiety									
Panic disorder	0(0%)	2(1%)	0.156	1(1%)	1(1%)	1.000	1(4.5%)	1(0.6%)	0.046
Generalized anxiety	0(0%)	4(2%)	0.044	2(2%)	2(2%)	1.000	0(0%)	4(2.2%)	0.033*
School avoidance	1(0.5%)	20(10%)	0.001	9(9.2%)	11(10.8%)	0.905	1(4.5%)	19(10.7%)	0.366
Social anxiety	1(0.05%)	25(12.5%)	0.001	11(11.2%)	14(13.7%)	0.521	3(13.6%)	22(12.4%)	0.928
Separation anxiety	0(0%)	23(11.5%)	0.001	11(11.2%)	12(11.8%)	0.706	3(13.6%)	20(11.2%)	0.739

Anxiety disorder analysis

We observed 2% study participants had Generalized anxiety disorder during Covid times which increased significantly from Pre-Covid to Covid. 11.5% showed separation anxiety during Covid time whereas during pre-covid it was 0% which increased significantly from Pre-Covid to Covid. We observed 12.5% among study participants showed social anxiety, which increased significantly. 10% study participants showed school avoidance which increased significantly from Pre-Covid to Covid. No significant difference in the Anxiety parameters between males and females. ($p > 0.05$) panic disorder (PN) and generalized anxiety disorder (GD) was significantly more among self-Covid-19 positive participants ($p < 0.05$).

Discussion

The COVID-19 pandemic has produced impacts on general health and child development through exposure to the virus and consequent infection, as well as through the social confinement recommended or mandated in an attempt to slow the progress of COVID-19, enable adequate medical care, and prevent the collapse of health care systems. [16] It has been reported that children certainly are being impacted by COVID-19 because it has changed their worlds. This is especially true if they have had sick family members or loved ones who have died during the pandemic. The loss of routine refreshing activities and the inability to socialize with family and friends add further to the feelings of anxiety and upheaval. [17]

In this study, the mean weight in pre-covid time was 33.52 ± 11.88 kg, which increased to 35.06 ± 11.78 kg in the covid time. This was found to be statistically significant ($p < 0.05$). The increase in mean weight could be attributed to decreased physical activity, no outdoor playing time, altered sleep pattern among children.

The literature demonstrates that, for both parents and children, sleep routines and the balance of daily activities are usually altered during social isolation. In this context, the quality and duration of sleep may be irregular, the level of physical and outdoor activities substantially decreases, and the use of electronic devices such as TVs, cell phones and tablets (screen time) increases. [18] These changes prevent child development from reaching its full potential. [19] In accordance with this, a statistically significant increase in mean screen time and sleep duration and statistically significant decrease in mean outdoor activity was noted in the present study ($p < 0.05$).

Ghosh R et al [20] elucidated that children of frontline workers suffer greater problems. The psychosocial impact of the pandemic has hit children more than the physical sufferings caused by the virus. School closure, lack of outdoor activity, aberrant dietary and sleeping habits disrupted children's usual lifestyle and could potentially promote monotony, distress, impatience, annoyance and varied neuropsychiatric manifestations. Incidences of domestic violence, child abuse, adulterated online contents could increase.

In our study we observed in our study that 14.5% children exhibited verbal aggression, 4.5% exhibited physical aggression, 2.0% showed auto-aggression, 3% exhibited aggression against property in the covid period. On statistical analysis, a significant increase was noted in verbal aggression, physical aggression, auto-aggression and aggression against property from pre-covid to the covid period ($p < 0.05$).

Batool S et al [21] have also conducted a study to assess the perception of frontline healthcare workers (HCWs) regarding the psychological impact of the COVID-19 pandemic on their children and concluded

that HCWs had a strong agreement about the adverse psychological and emotional effects of COVID-19 upon their children.

In our study 17% study participants showed signs of depression included 13.5% mild depression and 3.5% moderate depression in the covid period. This was found to be statistically significant on comparison with pre-covid period ($p < 0.05$). Our results are in accordance with Monique Theberath1 Et Al (2022) [22] which shows 23% depression in study participants. Whereas in Holmes^{MR19} explained that pandemic-related emotional responses may not be immediately evident in children, rather it would take decades and will be detected after a period of time. Child and adolescent psychiatrists label it as a sleeper effect.

Total 37% showed anxiety disorder which included Separation anxiety disorder (11.5%) social anxiety disorder (12.5%) and significant school avoidance (10%) generalized anxiety (10%) Panic-disorder (1%) in study participants respectively in the covid period. This was found to be statistically significant on comparison with pre-covid period ($p < 0.05$) which is similar to Monique Theberath1 Et Al (2022)²² study in which 28% of participants showed anxiety symptoms.

In our study we found Physical aggression was statistically significantly more among males compared to females. ($p < 0.05$). Whereas depression was found significantly more in females ($p < 0.05$). Which is similar to Nicole Racine, PhD et al (2021) [23] study suggests elevated depression and anxiety symptoms and the prevalence of clinically elevated depression and anxiety symptoms were higher in studies collected later in the pandemic and in girls.

In our study we found that mean age of study participants with auto-aggression, physical aggression and verbal aggression was observed to be 12.00 ± 3.56 , 12.77 ± 1.90 and 13.67 ± 2.50 years

respectively. Whereas mean age of study participants with depression was observed to be 10.97 ± 2.84 years.

Mean age of study participants with separation anxiety disorder, social anxiety disorder and significant school avoidance was observed to be 9.78 ± 2.022 , 9.48 ± 1.98 and 9.65 ± 2.13 years respectively. Frontline healthcare workers not only have extended duty hours but due to exposure or symptoms of coronavirus infections, they have to quarantine themselves for at least 2 weeks away from the family members, leading to additional mental trauma to them and their children. [22] It is evident that children and adolescents may be more vulnerable also because of home confinement, school closure, lack of in-person contact with classmates, friends, romantic partners, and teachers, and limitation in personal space at home. [24] The correlation between parent and child psychological distress underscores the strong link existing between parent-child mental health and brings attention to the critical role of the parent in buffering the distressing effects of the pandemic and its consequences upon their children. [25]

Conclusion

The present study highlights the psychosocial impact of COVID-19 on children of health care workers in terms of behavioral abnormalities including anxiety, aggression and depression. HCWs perceive that there is a strong psychological impact of COVID-19 on their children. Children are attached to their parents and are affected by the fear of their exposure to deadly virus. Government and private clinical centers must ensure formal psychological support services to the families of their employees in order to prevent the development of both short- and long-term serious mental disorders in these children. However, further studies with larger sample size are required to substantiate the findings of present study. Prospective studies to

evaluate the behavioural abnormalities with regular follow-ups must be conducted to study the psychosocial impact of COVID-19 with time.

References

- Ritchie, Hannah; Mathieu, Edouard; Rodés-Guirao, Lucas; Appel, Cameron; Giattino, Charlie; Ortiz-Ospina, Esteban; Hasell, Joe; Macdonald, Bobbie; Beltekian, Diana; Dattani, Saloni; Roser, Max (2020–2022). Coronavirus Pandemic (COVID-19). Our World in Data. Retrieved 16 March 2023.
- Andrews MA, Areekal Binu, Rajesh KR, Krishnan Jijith, Suryakala R, Krishnan Biju, Muraly CP, Santhosh PV. First confirmed case of COVID-19 infection in India: A case report. Indian Journal of Medical Research. May 2020; 151 (5): 490–492.
- Narasimhan, T. E. (30 January 2020). "India's first coronavirus case: Kerala student in Wuhan tested positive". Business Standard India. Archived from the original on 11 March 2020. Retrieved 7 March 2020.
- India's first coronavirus patient discharged after being cured. Hindustan Times. 20 February 2020. Retrieved 24 July 2021.
- Michael Safi (21 April 2021). India's shocking surge in Covid cases follows baffling decline. The Guardian. Retrieved 29 April 2021.
- Coronavirus. India becomes first country in the world to report over 4 lakh new cases on 30 April 2021. The Hindu. Special Correspondent. 30 April 2021. Retrieved 2 May 2021.
- India coronavirus: New record deaths as virus engulfs India. BBC News. 2 May 2021. Retrieved 3 May 2021.
- Coronavirus Highlights: 6,317 New Covid Cases in India, 213 Omicron Cases So Far.
- Coronavirus Highlights: India Records 1,685 New Cases, 83 Deaths in 24 Hours.
- Clark H, Coll-Seck AM, Banerjee A, Peterson S, Dalgligh SL, Ameratunga S, et al. A future for the world's children? AWHO-UNICEF-Lancet Commission. Lancet. 2020; 395:605-58.
- Liu JJ, Bao Y, Huang X, Shi J, Lu L. Mental health considerations for children quarantined because of COVID-19. Lancet Child Adolesc Health. 2020; 4:347–9.
- Jiao WY, Wang LN, Liu J et al. Behavioral and emotional disorders in children during the COVID-19 epidemic. J Pediatr. 2020; 221:264–6.
- Oh DL, Jerman P, Silvério Marques S et al. Systematic review of pediatric health outcomes associated with childhood adversity. BMC Pediatr. 2018; 18:83.
- King DL, Delfabbro PH, Billieux J, Potenza MN. Problematic online gaming and the COVID-19 pandemic. J Behav Addict. 2020;9(2):184-6.
- Green P. Risks to children and young people during COVID-19 pandemic. BMJ. 2020;369:m1669.
- Araújo LA, Veloso CF, Souza MC, Azevedo JMC, Tarro G. The potential impact of the COVID-19 pandemic on child growth and development: a systematic review. J Pediatr (Rio J). 2021;97(4):369-77.
- Gurwitch RH, Salem H, Nelson MM, Comer JS. Leveraging parent–child interaction therapy and telehealth capacities to address the unique needs of young children during the COVID-19 public health crisis. J Psych. 2020;15.
- Holmes MR. The sleeper effect of intimate partner violence exposure: Long-term consequences on young children's aggressive behavior. J Child Psychol Psychiatry. 2010; 54(9):986–95.
- Almis H, Han Almis B, Bucak IH. Mental health of children of health workers during the COVID-19 pandemic: A cross-sectional study.

- Clin Child Psychol Psychiatry. 2022; 27(1):104-11.
20. Ghosh R, Dubey MJ, Chatterjee S, Dubey S. Impact of COVID-19 on children: special focus on the psychosocial aspect. *Minerva Pediatr.* 2020;72(3):226-35.
 21. Batool S, Rehman R, Rafique S, Naqvi QA, Rathor AW, Qamar S. Perception of healthcare workers regarding the psychological impact of COVID-19 on their children. *Biomedica.* 2022;38(2):83-7.
 22. Monique The berath, David Bauer, Weizhi Chen, Manisha Salinas, Arya B Mohabbat, Juan Yang, Tony Y Chon, Brent A Bauer and Dietlind L Wahner-Roedler. Effects of COVID-19 pandemic on mental health of children and adolescents: A systematic review of survey studies.
 23. Nicole Racine, R Psych, Brae Anne McArthur, PhD, R Psych, Jessica E. Cooke; Rachel Eirich; Jenney Zhu, BA; Sheri Madigan, R Psych Global Prevalence of Depressive and Anxiety Symptoms in Children and Adolescents During. COVID-19.
 24. Ordway MR, Sadler LS, Canapari CA, Jeon S, Redeker NS. Sleep, biological stress, and health among toddlers living in socioeconomically disadvantaged homes: a research protocol. *Res Nurs Health.* 2017;40: 48: 9-500.
 25. Davico C, Ghiggia A, Marcotulli D, Ricci F, Amianto F, Vitiello B. Psychological Impact of the COVID-19 Pandemic on Adults and Their Children in Italy. *Front Psychiatry.* 2021; 12:572997.