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## Original Research Article

# A study to assess the risk factors contributing to psychological stress, anxiety and depression in mothers of Covid-19 positive hospitalized children in a Tertiary care hospital

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## ABSTRACT

**Background:** Parents of the COVID -19 positive hospitalized children are facing different psychological stresses which are affecting child's care and well-being.

**Aims:** To determine the psychological stress, anxiety and depression and to identify the associated influencing factors in mothers of hospitalized COVID-19 infected children

**Materials and Methods:** In this cross-sectional observational study, 150 mothers of COVID-19 positive hospitalized children in a paediatric tertiary care hospital were randomly selected and studied. Data collection tool was a two part questionnaire; the first part was based on 'Perceived stress scale-10' and 'Hospital anxiety and depression scale' and the second part included stressors related to COVID-19 pandemic selected based on previous researches. The incidence of these stressors and their significance in causing stress, anxiety and depression was assessed using standard statistical methods.

**Results:** 83.4% had moderate psychological stress, 35% had significant anxiety and 38% had significant depression. Worry about hospital bed availability and treatment cost (Odd's ratio>9) and worry about getting infection (Odd's ratio>8) as main stressors for stress, concern about family members and worry about getting infection (Odd's ratio>9 for both) as main factors for anxiety and concern about family members (Odd's ratio>22) as main factor for depression was found in study population.

**Conclusion:** This pandemic has imposed grave psychological impact on mothers of hospitalized COVID infected children and various influencing social factors have been identified through our study. Holistic approach including socio-economic, administrative and political measures should be taken and adequate psychological support should be provided to address maternal mental health related issues.

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## 1. Introduction

COVID-19 is now considered as the most important public health issue which also has devastating effects on psychological, social and economic aspects of

life: Paediatric cases of COVID-19 has also been reported increasingly. Based on worldwide data, the incidence of COVID-19 is 2% in the United States, 2.2% in China, 1.2% in Italy and 0.8% in Spain below 18 years age.<sup>1</sup> India has faced the second wave of COVID pandemic very recently and epidemiologists are speculating the surge of third wave very soon in which numbers paediatric cases will much

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Illness and hospitalization are often very critical events that a child has to face and the stress of this can affect the parents immensely. Chief factors responsible for causing stress and anxiety among parents are: factors related to child's health circumstances, environmental factors, managerial factors and socio-economic factors. Any epidemic or pandemic produces long-lasting psychological impacts on survivors and their family members and relatives. Daily increasing number of cases, growing number of mortality, scarcity of hospital beds and adequate health facilities, risk of being infected from the close contact with patient, worry about health of other family members, fear of death, sorrow of losing loved ones, social discrimination aroused as a result of fear, economic decline, loss of jobs, lack of food, insecurity; all these can act as igniting factors that can worsen the situation aggravating psychological stress and strain. Previous data on mass occurrences, like natural disasters shows that large scale disruptive events are strongly associated with ill-effects on mental health - post-traumatic stress disorder (PTSD) being the most frequently encountered followed by depression, anxiety, and other behavioral & psychological disorders. After the Spanish Flu pandemic (1918-1919), the number of first-time hospitalized patients with mental disorders attributed to influenza increased by an average annual factor of 7.2 in the 6 years following the pandemic.<sup>2</sup> During the EBOLA epidemic (2013–2016), there was significant increase of anxiety disorders, post-traumatic stress disorder and depression among contacts and caregivers.<sup>3</sup>

During this COVID-19 pandemic, we have seen news like, middle age woman killing her son and then committing suicide after her husband's death due to covid-19 in Kolkata (Aug 25, 2020)<sup>4</sup> or wife and son both committing suicide due to simple quarrel with the husband for availing online classes in Bogra, Bangladesh (June 11, 2020).<sup>5</sup> All these incidents give us an idea about the psychological impact and burden of stress, the pandemic has brought with it.

Unfortunately, in spite of having such importance, Parental stress assessment, identifying the stressors and development of action plans or training programmes in hospitals- all these have been neglected worldwide specially in the developing countries like India. Parental mental health is not only associated with treatment related outcome, but also have long termed effect on child's normal physical and mental well-being and development. But very few studies have been done addressing the parental psychological issues due to this pandemic.

As working members of a tertiary care hospital dedicated for COVID -19 positive patients, we got a great opportunity to assess the psychological impact like stress, anxiety and depression of COVID-19 on parents of the children who are positive for the virus and admitted in the hospital.

### 1.1. Our main objectives of the research was

1. To determine and measure the psychological stress, anxiety and depression among parents of hospitalized children suffering from COVID-19.
2. To determine the influencing factors that are associated with psychological stress among parents of hospitalized children suffering from COVID-19.

## 2. Materials and Methods

This study was a cross-sectional Observational single centre tertiary care hospital based study performed on mothers of 150 hospitalized COVID-19 positive children at the Paediatric ward of our hospital in 2020 after getting clearance from the ethical committee for conducting the study (reference number- MC/KOL/IEC/NON-SPON/762/08/20). The study period was 3 months; May 2020 to July 2020. The sample size was determined considering a 95% confidence level and 80% statistical power using simple random sampling without replacement on a limited population. Mothers staying along with hospitalized COVID-19 positive patients in paediatric ward who were randomly selected and gave consent to participate in the study were included in the study. Mothers of children admitted in critical care ward (COVID PICU/HDU) and mothers whose children died during the course and mothers who's any other family members are critically ill due to COVID or died recently for the same were excluded from the study.

A self-response 2 part questionnaires was used for data collection. The first part had questions targeted to quantify the candidate's psychological stress, anxiety and depression based on scoring system. This part of the questionnaire was made based on Perceived Stress Scale-10 (PSS-10) and Hospital Anxiety and Depression scale (HADS). In PSS-10 total 10 questions are generally asked and scores are given based on a five-point scale ranging from (0) Never to (4) Very Often. While scoring, the scores attained in the questions determining to assess positive stress i.e. question no. 4,5,7 and 8 are reversed as follows : 0=4, 1=3, 2=2, 3=1, 4=0. Finally, scores of these questions and of the rest six are summed up to attain the final score. Final score: ranging from 0-13 is considered as Low stress, ranging from 14-26 is considered as Moderate stress and ranging from 27- 40 is considered as High perceived stress.<sup>6</sup> Hospital Anxiety and Depression scale is a 14 item scale having 7 questions for anxiety and 7 questions for depression. Each item on the questionnaire is scored from 0-3 and this means that a person can score between 0 and 21 for either anxiety or depression. Score 0-7 is considered Normal, 8-10 is considered Borderline and 11-21 is considered Abnormal for either anxiety or depression category.<sup>7</sup>

Additional questions were added particularly to quantify stress that arises from specific problems faced in COVID

-19 situation in the second part of the questionnaire. Based on previous studies done during Ebola epidemic and COVID-19 pandemic few stressors were pre-determined and questions to quantify those stressors were framed. These were: Self-blame, worry about other family members, worry about own, effect of lock down and quarantine, effect of daily news in print, electronic and social media, financial crisis related stressor, health care facilities availability and cost related stress, social discrimination, hospital logistics related stress, discrimination from health care providers and post admission mental state. Responses were rated and categorized based on 'YES/NO' response. Detailed questions are given in Annexure.

Questionnaires were prepared in English, Bengali and Hindi. We used cross-cultural translation guidelines recommended by International Quality of Life Assessment Project in order to translate the whole questionnaire from English to Bengali and Hindi. Forward translation was done independently by three bilingual translators and minor differences were solved by the research team. The forward version was then back translated by two other bilingual translators. In a pre-final phase, the questionnaire was given to 10 people, who were encouraged to make comments and suggestions on the clarity of the wording, difficulties during completion and on the layout and style of the tool. Changes were done as per suggestions.

To determine the reliability, the questionnaire was completed through interviews with 20 parents of hospitalized children at the pediatric ward in Medical college and hospital, Kolkata and then Cronbach's alpha reliability was used. The reliability result obtained in different parts was more than 80 percent.

Sampling was conducted in the morning shift after completion of visits by the nursing staff if the mother was ready for the interview. All interviews were done on day 2 of hospital admission i.e. 24 hours after hospital admission.

All gathered data was uploaded to a data base maintained to track the records. Records kept were confidential and available only to staff related to the survey. MS EXCEL and SPSS were used where appropriate for analysis. Descriptive statistics were expressed in terms of ratio, proportion or percentage (for categorical data) and mean with standard deviation, median or range (for numerical data). To compare effect of various COVID related stressors in causing stress anxiety and depression, the results obtained by PSS-10 were grouped in two groups-'insignificant stress'(includes population having low stress in PSS-10) and 'significant stress'(includes population having moderate stress and severe stress as per PSS-10). Similarly, results obtained by HADS scale were group in- 'normal' (includes population found normal by HADS) and 'anxious' (includes population found borderline anxious and anxious in HADS) and 'depressed' (includes population found borderline depressed and depressed in HADS) for anxiety

and depression respectively. Odd's ratio was calculated for individual stressors in causing stress, anxiety and depression and Forward Multivariate Linear Regression model was applied to see impact of each stressors.

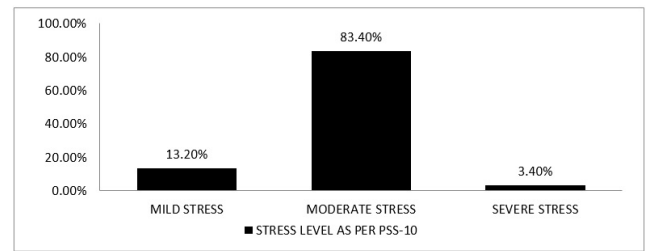


Fig. 1: Distribution of study population as per PSS-10.

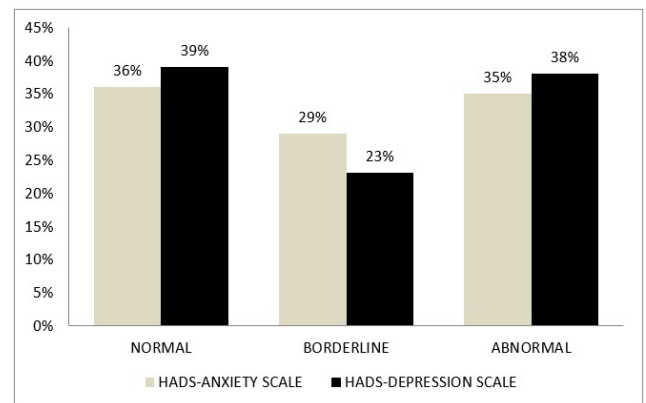


Fig. 2: Distribution of study population as per HADS anxiety and depression scale.

### 3. Results

As per PSS-10, among 150 mothers most of them had Moderate stress (83.4%), 13.2% had mild stress and only 3.4% had severe stress (Figure 1).

As per HADS anxiety scale, among 150 mothers, 35% had significant anxiety, 29% had borderline anxiety and 36% were normal. As per HADS depression scale, among the 150 mothers, 38% had significant depression, 23% had borderline depression and 39% were normal. The incidence of depression and anxiety (combined significant and borderline) was almost equal in the study population (61% and 64% respectively) (Figure 2).

The most prevalent COVID-19 pandemic related stressors were- concern about health of other family members, prolonged home stay and financial loss due to lock down, fear from daily COVID death related news on various news media, worry about hospital bed and other logistic availability, worry about getting infection- as more than 80% of the study population having significant psychological stress as per PSS-10 and significant anxiety

**Table 1:** Association of COVID related stressors with PSS-10 scale.

Stress Factors	Questions	Response	Insignificant stress %	Significant stress %	p- value	Odds ratio	R <sup>2</sup> value	p- value																																																																																																																																																																																										
Self-blame	Ques 1	NO	100	56.2	<0.001	0.215	0.581	<0.001																																																																																																																																																																																										
		YES	0	46.8					Concern about Family	Ques 2	NO	95	17.7	<0.001	5.484	0.406	<0.001	YES	5	82.3	Worry about Self	Ques 3	NO	100	27.7	<0.001	5.529	0.626	<0.001	YES	0	72.3	Effect of Lockdown	Ques 4	NO	100	33.1	<0.001	8.700	0.762	<0.001	YES	0	66.9	Effect of news	Ques 5	NO	100	3.8	<0.001	2.604	0.206	<0.001	YES	0	96.2	Scarcity of bed and Treatment cost	Ques 6	NO	100	6.9	<0.001	2.750	0.248	<0.001	YES	0	93.1	related stress	Ques 7	NO	100	7.7	<0.001	2.791	0.259	<0.001	YES	0	92.3	Social Discrimination	Ques 8	NO	100	33.8	<0.001	9.556	0.784	<0.001	YES	0	66.2	Post Admission Stress	Ques 9	NO	100	37.7	<0.001	20.250	0.898	<0.001	YES	0	62.3	Hospital Facilities	Ques 10	NO	100	26.2	<0.001	9.053	0.591	<0.001	YES	0	73.8	Related Stress	Ques 11	NO	100	44.6	<0.001	0.064	0.874	<0.001	YES	0	55.4	Stress due to behavioural	Ques 12	NO	100	44.6	<0.001	0.064	0.834	<0.001	YES	0	55.4	Issues from HCWs	Ques 13	NO	84.9	100	0.097	0.446	0.012	0.097	YES	15.1	0	Stress due to ill behavioural	Ques 14	NO	100	60	<0.001	0.255	0.500	<0.001	YES	0	40	Stress due to ill behavioural	Ques 15	NO	100	73.8	<0.001	0.371	0.273	<0.001	YES	0	26.2	Stress due to ill behavioural	Ques 16	NO	100	84.6	<0.001	0.438	0.140	<0.001	YES	0	15.4	Stress due to ill behavioural	Ques 17	NO	100	80.8	<0.001
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		YES	0	66.2					Post Admission Stress	Ques 9	NO	100	37.7	<0.001	20.250	0.898	<0.001	YES	0	62.3	Hospital Facilities	Ques 10	NO	100	26.2	<0.001	9.053	0.591	<0.001	YES	0	73.8	Related Stress	Ques 11	NO	100	44.6	<0.001	0.064	0.874	<0.001	YES	0	55.4	Stress due to behavioural	Ques 12	NO	100	44.6	<0.001	0.064	0.834	<0.001	YES	0	55.4	Issues from HCWs	Ques 13	NO	84.9	100	0.097	0.446	0.012	0.097	YES	15.1	0	Stress due to ill behavioural	Ques 14	NO	100	60	<0.001	0.255	0.500	<0.001	YES	0	40	Stress due to ill behavioural	Ques 15	NO	100	73.8	<0.001	0.371	0.273	<0.001	YES	0	26.2	Stress due to ill behavioural	Ques 16	NO	100	84.6	<0.001	0.438	0.140	<0.001	YES	0	15.4	Stress due to ill behavioural	Ques 17	NO	100	80.8	<0.001	0.416	0.184	<0.001	YES	0	19.2																																																																														
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and depression as per HADS gave 'yes' response to the questions framed to measure these stressors and the results were statistically significant (p value <0.01). (Tables 1, 2 and 3).

In case of stress, the impact of these stressors in decreasing order was- worry about hospital bed and other logistic availability (odd's ratio >9 for all related questions), worry about getting infection (odd's ratio >8), concern about health of other family members (odd's ratio >5 for all related questions) followed by prolonged home stay and financial loss due to lock down (odd's ratio > 2 for all related questions) and fear from daily COVID death related news on various news media (odd's ratio >2). (Table 1).

In case of anxiety, the impact of the stressors in decreasing order was- concern about health of other family members (odd's ratio >9 for all related questions), worry

about getting infection (odd's ratio >6), fear from daily COVID death related news on various news media (odd's ratio >5) followed by worry about hospital bed and other logistic availability (odd's ratio > 4 for all related questions) and prolonged home stay and financial loss due to lockdown (odd's ratio > 4 for all related questions) (Table 2).

However, when multivariate regression model was applied to see the combined effect of these stressors, prolonged home stay and financial loss due to lock down and fear from daily COVID death related news on various news media — these two factors were found to have less significant effect compared to the other three factors as contributing factors for stress, anxiety and depression based on R<sup>2</sup> values. (Tables 1, 2 and 3)

The least important stressors were post admission stress and stress due to ill behaviour from health care staff

**Table 2:** Association of COVID related stressors with HADS anxiety scale.

Stress Factors	Questions	Response	Normal	Anxious	p- value	Odd's ratio	R <sup>2</sup> value	p- value																																																																																																																																																																																										
Self-blame	Ques 1	NO	100	40.6	<0.001	0.419	0.345	<0.001																																																																																																																																																																																										
		YES	0	59.4					Concern about Family	Ques 2	NO	77.8	0	<0.001	9.312	0.689	<0.001	YES	22.2	100	Worry about Self	Ques 3	NO	100	2.1	<0.001	9.870	0.616	<0.001	YES	0	97.9	Effect of Lockdown	Ques 4	NO	100	9.4	<0.001	6.9	0.775	<0.001	YES	0	90.6	Effect of news	Ques 5	NO	46.3	0	<0.001	4.314	0.351	<0.001	YES	53.7	100	Scarcity of bed and Treatment cost	Ques 6	NO	53.7	0	<0.001	4.840	0.422	<0.001	YES	46.3	100	related stress	Ques 7	NO	55.6	0	<0.001	5.12	0.441	<0.001	YES	44.4	100	Social Discrimination	Ques 8	NO	100	10.4	<0.001	4.6	0.754	<0.001	YES	0	89.6	Post Admission Stress	Ques 9	NO	100	15.6	<0.001	4.6	0.658	<0.001	YES	0	84.4	Hospital Facilities Related Stress	Ques 10	NO	100	0	<0.001	4.5	0.791	<0.001	YES	0	100	Stress ue to behavioural	Ques 11	NO	100	25	<0.001	0.308	0.516	<0.001	YES	0	75	Issues from HCWs	Ques 12	NO	100	25	<0.001	0.308	0.565	<0.001	YES	0	75	Hospital Facilities Related Stress	Ques 13	NO	79.6	100	0.031	0.309	0.025	0.031	YES	20.4	0	Stress ue to behavioural	Ques 14	NO	100	45.8	<0.001	0.499	0.294	<0.001	YES	0	54.2	Issues from HCWs	Ques 15	NO	100	64.6	<0.001	0.534	0.159	<0.001	YES	0	35.4	Issues from HCWs	Ques 16	NO	100	79.2	<0.001	0.585	0.080	<0.001	YES	0	20.8	Issues from HCWs	Ques 17	NO	100	74	<0.001
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		YES	22.2	100					Worry about Self	Ques 3	NO	100	2.1	<0.001	9.870	0.616	<0.001	YES	0	97.9	Effect of Lockdown	Ques 4	NO	100	9.4	<0.001	6.9	0.775	<0.001	YES	0	90.6	Effect of news	Ques 5	NO	46.3	0	<0.001	4.314	0.351	<0.001	YES	53.7	100	Scarcity of bed and Treatment cost	Ques 6	NO	53.7	0	<0.001	4.840	0.422	<0.001	YES	46.3	100	related stress	Ques 7	NO	55.6	0	<0.001	5.12	0.441	<0.001	YES	44.4	100	Social Discrimination	Ques 8	NO	100	10.4	<0.001	4.6	0.754	<0.001	YES	0	89.6	Post Admission Stress	Ques 9	NO	100	15.6	<0.001	4.6	0.658	<0.001	YES	0	84.4	Hospital Facilities Related Stress	Ques 10	NO	100	0	<0.001	4.5	0.791	<0.001	YES	0	100	Stress ue to behavioural	Ques 11	NO	100	25	<0.001	0.308	0.516	<0.001	YES	0	75	Issues from HCWs	Ques 12	NO	100	25	<0.001	0.308	0.565	<0.001	YES	0	75	Hospital Facilities Related Stress	Ques 13	NO	79.6	100	0.031	0.309	0.025	0.031	YES	20.4	0	Stress ue to behavioural	Ques 14	NO	100	45.8	<0.001	0.499	0.294	<0.001	YES	0	54.2	Issues from HCWs	Ques 15	NO	100	64.6	<0.001	0.534	0.159	<0.001	YES	0	35.4	Issues from HCWs	Ques 16	NO	100	79.2	<0.001	0.585	0.080	<0.001	YES	0	20.8	Issues from HCWs	Ques 17	NO	100	74	<0.001	0.568	0.107	<0.001	YES	0	26						
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related stress	Ques 7	NO	55.6	0	<0.001	5.12	0.441	<0.001																																																																																																																																																																																										
		YES	44.4	100					Social Discrimination	Ques 8	NO	100	10.4	<0.001	4.6	0.754	<0.001	YES	0	89.6	Post Admission Stress	Ques 9	NO	100	15.6	<0.001	4.6	0.658	<0.001	YES	0	84.4	Hospital Facilities Related Stress	Ques 10	NO	100	0	<0.001	4.5	0.791	<0.001	YES	0	100	Stress ue to behavioural	Ques 11	NO	100	25	<0.001	0.308	0.516	<0.001	YES	0	75	Issues from HCWs	Ques 12	NO	100	25	<0.001	0.308	0.565	<0.001	YES	0	75	Hospital Facilities Related Stress	Ques 13	NO	79.6	100	0.031	0.309	0.025	0.031	YES	20.4	0	Stress ue to behavioural	Ques 14	NO	100	45.8	<0.001	0.499	0.294	<0.001	YES	0	54.2	Issues from HCWs	Ques 15	NO	100	64.6	<0.001	0.534	0.159	<0.001	YES	0	35.4	Issues from HCWs	Ques 16	NO	100	79.2	<0.001	0.585	0.080	<0.001	YES	0	20.8	Issues from HCWs	Ques 17	NO	100	74	<0.001	0.568	0.107	<0.001	YES	0	26																																																																		
Social Discrimination	Ques 8	NO	100	10.4	<0.001	4.6	0.754	<0.001																																																																																																																																																																																										
		YES	0	89.6					Post Admission Stress	Ques 9	NO	100	15.6	<0.001	4.6	0.658	<0.001	YES	0	84.4	Hospital Facilities Related Stress	Ques 10	NO	100	0	<0.001	4.5	0.791	<0.001	YES	0	100	Stress ue to behavioural	Ques 11	NO	100	25	<0.001	0.308	0.516	<0.001	YES	0	75	Issues from HCWs	Ques 12	NO	100	25	<0.001	0.308	0.565	<0.001	YES	0	75	Hospital Facilities Related Stress	Ques 13	NO	79.6	100	0.031	0.309	0.025	0.031	YES	20.4	0	Stress ue to behavioural	Ques 14	NO	100	45.8	<0.001	0.499	0.294	<0.001	YES	0	54.2	Issues from HCWs	Ques 15	NO	100	64.6	<0.001	0.534	0.159	<0.001	YES	0	35.4	Issues from HCWs	Ques 16	NO	100	79.2	<0.001	0.585	0.080	<0.001	YES	0	20.8	Issues from HCWs	Ques 17	NO	100	74	<0.001	0.568	0.107	<0.001	YES	0	26																																																																														
Post Admission Stress	Ques 9	NO	100	15.6	<0.001	4.6	0.658	<0.001																																																																																																																																																																																										
		YES	0	84.4					Hospital Facilities Related Stress	Ques 10	NO	100	0	<0.001	4.5	0.791	<0.001	YES	0	100	Stress ue to behavioural	Ques 11	NO	100	25	<0.001	0.308	0.516	<0.001	YES	0	75	Issues from HCWs	Ques 12	NO	100	25	<0.001	0.308	0.565	<0.001	YES	0	75	Hospital Facilities Related Stress	Ques 13	NO	79.6	100	0.031	0.309	0.025	0.031	YES	20.4	0	Stress ue to behavioural	Ques 14	NO	100	45.8	<0.001	0.499	0.294	<0.001	YES	0	54.2	Issues from HCWs	Ques 15	NO	100	64.6	<0.001	0.534	0.159	<0.001	YES	0	35.4	Issues from HCWs	Ques 16	NO	100	79.2	<0.001	0.585	0.080	<0.001	YES	0	20.8	Issues from HCWs	Ques 17	NO	100	74	<0.001	0.568	0.107	<0.001	YES	0	26																																																																																										
Hospital Facilities Related Stress	Ques 10	NO	100	0	<0.001	4.5	0.791	<0.001																																																																																																																																																																																										
		YES	0	100					Stress ue to behavioural	Ques 11	NO	100	25	<0.001	0.308	0.516	<0.001	YES	0	75	Issues from HCWs	Ques 12	NO	100	25	<0.001	0.308	0.565	<0.001	YES	0	75	Hospital Facilities Related Stress	Ques 13	NO	79.6	100	0.031	0.309	0.025	0.031	YES	20.4	0	Stress ue to behavioural	Ques 14	NO	100	45.8	<0.001	0.499	0.294	<0.001	YES	0	54.2	Issues from HCWs	Ques 15	NO	100	64.6	<0.001	0.534	0.159	<0.001	YES	0	35.4	Issues from HCWs	Ques 16	NO	100	79.2	<0.001	0.585	0.080	<0.001	YES	0	20.8	Issues from HCWs	Ques 17	NO	100	74	<0.001	0.568	0.107	<0.001	YES	0	26																																																																																																						
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		YES	0	75					Issues from HCWs	Ques 12	NO	100	25	<0.001	0.308	0.565	<0.001	YES	0	75	Hospital Facilities Related Stress	Ques 13	NO	79.6	100	0.031	0.309	0.025	0.031	YES	20.4	0	Stress ue to behavioural	Ques 14	NO	100	45.8	<0.001	0.499	0.294	<0.001	YES	0	54.2	Issues from HCWs	Ques 15	NO	100	64.6	<0.001	0.534	0.159	<0.001	YES	0	35.4	Issues from HCWs	Ques 16	NO	100	79.2	<0.001	0.585	0.080	<0.001	YES	0	20.8	Issues from HCWs	Ques 17	NO	100	74	<0.001	0.568	0.107	<0.001	YES	0	26																																																																																																																		
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		YES	0	75					Hospital Facilities Related Stress	Ques 13	NO	79.6	100	0.031	0.309	0.025	0.031	YES	20.4	0	Stress ue to behavioural	Ques 14	NO	100	45.8	<0.001	0.499	0.294	<0.001	YES	0	54.2	Issues from HCWs	Ques 15	NO	100	64.6	<0.001	0.534	0.159	<0.001	YES	0	35.4	Issues from HCWs	Ques 16	NO	100	79.2	<0.001	0.585	0.080	<0.001	YES	0	20.8	Issues from HCWs	Ques 17	NO	100	74	<0.001	0.568	0.107	<0.001	YES	0	26																																																																																																																														
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		YES	0	26																																																																																																																																																																																														

as only less than 40% of the study population with significant stress/anxiety/depression gave 'yes' response to the questions made to assess this stressor. They had very insignificant impact in stress anxiety and depression having odd's ratio <1 for both of these stressors (Tables 1, 2 and 3).

#### 4. Discussion

In our study we have tried to find out the chief contributing factors for psychological stress, anxiety and depression among mothers of COVID-19 positive hospitalized children. No studies had been done previously in this field till now. It has been found in our study that majority of the mothers had moderate psychological stress and borderline to significant anxiety and depression.

Various studies have been done so far to assess psychological impact of child's hospitalization due to

different diseases on parent's mental health. A pilot study using questionnaires assessing psychological function conducted on parents of 28 hospitalized children in order to assess the stress, anxiety and depression among them after admission had found that 59% of the parents had borderline amount of anxiety and 48% had borderline amount of depression.<sup>8</sup> Another study done at Punjab on 100 parents of children who are admitted at PICU found that significant stress occurs among the parents if their child is critically ill.<sup>9</sup> On the other hand different studies have been done so far to assess the psychological damage created by the COVID-19 pandemic on general population. A survey in China done online using IES -R and DSS-21 scale on 1304 candidates chosen by snow ball sampling from general population, found that 53.8% of respondents rated the psychological impact of outbreak as moderate or severe; 16.5% of respondents reported moderate to

**Table 3:** Association of COVID related stress with HADSdepression scale.

Stress Factors	Questions	Response	Normal	Depressed	p- value	Odds ratio	R <sup>2</sup> value	p- value																																																																																																																																																																																										
Self-blame	Ques 1	NO	100	37.4	<0.001	0.366	0.393	<0.001																																																																																																																																																																																										
		YES	0	62.6					Concern about Family	Ques 2	NO	71.2	0	<0.001	22.353	0.597	<0.001	YES	28.8	100	Worry about Self	Ques 3	NO	94.9	0	<0.001	31.33	0.518	<0.001	YES	5.1	100	Effect of Lockdown	Ques 4	NO	100	4.4	<0.001	0.063	0.895	<0.001	YES	0	95.6	Effect of news	Ques 5	NO	42.4	0	<0.001	3.676	0.304	<0.001	YES	57.6	100	Scarcity of bed and Treatment cost	Ques 6	NO	49.2	0	<0.001	3.739	0.304	<0.001	YES	50.8	100	related stress	Ques 7	NO	50.8	0	<0.001	4.138	0.365	<0.001	YES	49.2	100	Social Discrimination	Ques 8	NO	100	5.5	<0.001	12.87	0.881	<0.001	YES	0	94.5	Post Admission Stress	Ques 9	NO	100	11	<0.001	11.80	0.870	<0.001	YES	0	89	Hospital Facilities Related Stress	Ques 10	NO	91.5	0	<0.001	19.23	0.759	<0.001	YES	9.5	100	Stress due to behavioural	Ques 11	NO	100	20.9	<0.001	0.244	0.867	<0.001	YES	0	79.1	Issues from HCWs	Ques 12	NO	100	20.9	<0.001	0.244	0.887	<0.001	YES	0	79.1	Stress	Ques 13	NO	81.4	100	0.045	0.345	0.020	0.045	YES	18.6	0	Hospital Facilities Related Stress	Ques 14	NO	100	42.9	<0.001	0.398	0.340	<0.001	YES	0	57.1	Stress due to behavioural	Ques 15	NO	100	62.6	<0.001	0.491	0.185	<0.001	YES	0	37.4	Issues from HCWs	Ques 16	NO	100	78	<0.001	0.546	0.094	<0.001	YES	0	22	Stress	Ques 17	NO	100	72.5	<0.001
Concern about Family	Ques 2	NO	71.2	0	<0.001	22.353	0.597	<0.001																																																																																																																																																																																										
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Worry about Self	Ques 3	NO	94.9	0	<0.001	31.33	0.518	<0.001																																																																																																																																																																																										
		YES	5.1	100					Effect of Lockdown	Ques 4	NO	100	4.4	<0.001	0.063	0.895	<0.001	YES	0	95.6	Effect of news	Ques 5	NO	42.4	0	<0.001	3.676	0.304	<0.001	YES	57.6	100	Scarcity of bed and Treatment cost	Ques 6	NO	49.2	0	<0.001	3.739	0.304	<0.001	YES	50.8	100	related stress	Ques 7	NO	50.8	0	<0.001	4.138	0.365	<0.001	YES	49.2	100	Social Discrimination	Ques 8	NO	100	5.5	<0.001	12.87	0.881	<0.001	YES	0	94.5	Post Admission Stress	Ques 9	NO	100	11	<0.001	11.80	0.870	<0.001	YES	0	89	Hospital Facilities Related Stress	Ques 10	NO	91.5	0	<0.001	19.23	0.759	<0.001	YES	9.5	100	Stress due to behavioural	Ques 11	NO	100	20.9	<0.001	0.244	0.867	<0.001	YES	0	79.1	Issues from HCWs	Ques 12	NO	100	20.9	<0.001	0.244	0.887	<0.001	YES	0	79.1	Stress	Ques 13	NO	81.4	100	0.045	0.345	0.020	0.045	YES	18.6	0	Hospital Facilities Related Stress	Ques 14	NO	100	42.9	<0.001	0.398	0.340	<0.001	YES	0	57.1	Stress due to behavioural	Ques 15	NO	100	62.6	<0.001	0.491	0.185	<0.001	YES	0	37.4	Issues from HCWs	Ques 16	NO	100	78	<0.001	0.546	0.094	<0.001	YES	0	22	Stress	Ques 17	NO	100	72.5	<0.001	0.598	0.124	<0.001	YES	0	27.5																		
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		YES	57.6	100					Scarcity of bed and Treatment cost	Ques 6	NO	49.2	0	<0.001	3.739	0.304	<0.001	YES	50.8	100	related stress	Ques 7	NO	50.8	0	<0.001	4.138	0.365	<0.001	YES	49.2	100	Social Discrimination	Ques 8	NO	100	5.5	<0.001	12.87	0.881	<0.001	YES	0	94.5	Post Admission Stress	Ques 9	NO	100	11	<0.001	11.80	0.870	<0.001	YES	0	89	Hospital Facilities Related Stress	Ques 10	NO	91.5	0	<0.001	19.23	0.759	<0.001	YES	9.5	100	Stress due to behavioural	Ques 11	NO	100	20.9	<0.001	0.244	0.867	<0.001	YES	0	79.1	Issues from HCWs	Ques 12	NO	100	20.9	<0.001	0.244	0.887	<0.001	YES	0	79.1	Stress	Ques 13	NO	81.4	100	0.045	0.345	0.020	0.045	YES	18.6	0	Hospital Facilities Related Stress	Ques 14	NO	100	42.9	<0.001	0.398	0.340	<0.001	YES	0	57.1	Stress due to behavioural	Ques 15	NO	100	62.6	<0.001	0.491	0.185	<0.001	YES	0	37.4	Issues from HCWs	Ques 16	NO	100	78	<0.001	0.546	0.094	<0.001	YES	0	22	Stress	Ques 17	NO	100	72.5	<0.001	0.598	0.124	<0.001	YES	0	27.5																																										
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		YES	49.2	100					Social Discrimination	Ques 8	NO	100	5.5	<0.001	12.87	0.881	<0.001	YES	0	94.5	Post Admission Stress	Ques 9	NO	100	11	<0.001	11.80	0.870	<0.001	YES	0	89	Hospital Facilities Related Stress	Ques 10	NO	91.5	0	<0.001	19.23	0.759	<0.001	YES	9.5	100	Stress due to behavioural	Ques 11	NO	100	20.9	<0.001	0.244	0.867	<0.001	YES	0	79.1	Issues from HCWs	Ques 12	NO	100	20.9	<0.001	0.244	0.887	<0.001	YES	0	79.1	Stress	Ques 13	NO	81.4	100	0.045	0.345	0.020	0.045	YES	18.6	0	Hospital Facilities Related Stress	Ques 14	NO	100	42.9	<0.001	0.398	0.340	<0.001	YES	0	57.1	Stress due to behavioural	Ques 15	NO	100	62.6	<0.001	0.491	0.185	<0.001	YES	0	37.4	Issues from HCWs	Ques 16	NO	100	78	<0.001	0.546	0.094	<0.001	YES	0	22	Stress	Ques 17	NO	100	72.5	<0.001	0.598	0.124	<0.001	YES	0	27.5																																																																		
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severe depressive symptoms; 28.8% of respondents reported moderate to severe anxiety symptoms; and 8.1% reported moderate to severe stress levels.<sup>10</sup>

Some studies have been done to assess psychological effect of COVID -19 on parental mental health whose children were not infected by the virus. A study in U.S. involving mothers of children between 0-8 years of non-infected children found that clinically-relevant depression was indicated in 33.16%, 42.55%, and 43.37% of mothers of children age 0–18 months, 18 months to 4 years, and 5 to 8 years, respectively. Prevalence of anxiety was 36.27%, 32.62%, and 29.59% for mothers across age groups, respectively.<sup>11</sup>

Very few studies on impact of COVID-19 on parent's psychology of hospitalized children are available. A study done at China, involving 100 parents of hospitalized

children (50 parents of children hospitalized during COVID-19 epidemic and 50 parents of children hospitalized during the non-epidemic period) found that both anxiety and depression were significantly higher among parents whose children got admitted at the hospital during the time of this epidemic.<sup>12</sup> But all these children admitted in the hospital due to other diseases and not due to COVID-19.

From the above discussion it is clear that hospitalization of children and COVID-19 itself are independent risk factor for damaging mental health of the parents of the sick children. So it can be assumed that the amount of stress, anxiety and depression level of parents whose children are getting admitted due to COVID-19 infection will be immense and has been reflected well through our study.

Another objective of our study was to find out various COVID-19 related stressors and their importance to produce

psychological impact on the study population. It had been found in our study that, worry about health of other family members, prolonged home stay and financial loss due to lock down, fear from daily COVID death related news on various news media, worry about hospital bed and other logistic availability, worry about getting infection; these were the chief stressors causing stress, anxiety and depression among parents of COVID-19 positive hospitalized children.

Worry about hospital bed and other logistic availability and worry about getting infection were the main stressors in causing stress. On the other hand, concern about health of other family members and worry about getting infection were chiefly responsible for causing anxiety among study population. Concern about health of other family members was found to be the main factor causing depression among the mothers.

Though no direct comparable study available, a large cross-sectional study which included 3042 people from U.S and Israel found that chief factors creating worries during this pandemic in decreasing order were : worry about other family members health, worry about unintentionally infecting others, worry about financial loss and burden, worry about getting the infection and fear of death. These COVID-19-related worries were associated with substantial levels of anxiety (22%) and depression (16%) which were pretty much higher from normal point prevalence rates reported before pandemic.<sup>13</sup> Another online survey done in Italy involving 854 parents on April 2020 showed that COVID-19 is associated with increased stress among parents. Quarantine related self-isolation, loneliness, adjustment with home environment etc. and parent's individual and dyadic stress were the most important determining factors.<sup>14</sup> However, all these studies were done on parents of healthy/non infected children.

Being a single centred study done on subjects of a specific socio-demographic and economic strata, findings of our study may differ for larger population and in other socio-geographical settings and further large scale epidemiological evaluation is required in this field. Despite, the results of our research surely helps to give an idea about psychological impact and burden created by this pandemic on parental mental health of COVID infected children and also points towards the most important stressors responsible for the psychological demise. Thus, It reminds the importance of addressing mental health related issues of these parents during this pandemic situation and also indicates the need of in depth professional training programs for health care providers to deal with their psychological issues.

In conclusion, this study reminds the need of sensitization of health care workers towards the psychological need of parents of the paediatric COVID patients admitted in the hospital and also focuses on the different factors that affect the psychological health of the

parents which needs to be addressed by a holistic approach including social, economic, administrative and political measures.

## Appendix

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