Comparison of COVID Related Stress in Vaccinated COVID-19 Survivors and Non-COVID-19 Population: A Comparative Study from North India

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ABSTRACT

Background: Community Medicine specialists play a crucial role in the prevention and control of communicable and non-communicable diseases, monitoring and surveillance, healthcare planning and management and research but the awareness about the speciality even among the medical fraternity is limited. **Aim:** To determine the perceptions of Medical Professionals from Tertiary care teaching institutes towards the specialty of community medicine and its specialists. **Materials and Methods:** This was a web based cross-sectional survey conducted in October- November, 2021 among Medical professionals of Tertiary Care Teaching Institutes in the state of Uttar Pradesh, North India using a semi structured, pretested questionnaire circulated as google forms using WhatsApp and personal email ids. **Results:** A total 406 participants consented and completed the survey questionnaire out of the 456 contacted eligible individuals (response rate 89.04%) of which 231 (57.0%) were males and 175 (43.0%) were females. Majority (83.0%) of the participants agreed that the 'information and knowledge gained in Community Medicine by them would certainly help in their future medical practice" and an overwhelmingly majority (91.1%) agreed to the statement that 'a physician can't effectively control most infectious disease without adequate knowledge of Epidemiology'. Around 70% of the participants agreed that Community Medicine Specialists have good work life balance and 87.4% agreed that speciality of Community Medicine offers adequate scholarly and research opportunities. Further, 77.6% of the participants agreed that Community Medicine has enough opportunities for direct public contact compared to other specialty and around 64% agreed that the speciality offers the opportunity to utilize newer technologies, Artificial Intelligence and Machine Learning. Around 61% of the participants agreed that COVID-19 pandemic will affect the choice of specialty among the PG aspirants. **Conclusion:** Majority of the Medical professionals have positive perceptions towards the speciality of Community Medicine and its specialists. The COVID-19 pandemic may be an important cause for the changing perception towards the speciality among the medical fraternity.

Key words: COVID-19, Anxiety, Depression, Stress, Community Psychiatry, Vaccination.

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INTRODUCTION

Ever since the discovery of a novel corona virus (COVID-19) in Wuhan, Hubei, China in 2019.[1] there has been a substantial change in the social, professional, physical and psychological dimensions of our lives. India too is affected by this pandemic. The first case of COVID-19 in India was reported in January 2020 and since then there have been increasing number of cases of COVID-19.[2] In late 2020 and early 2021 the entire world including India was hit by second wave of COVID-19 due the mutations in the SARS-CoV leading to the emergence of the delta variant (B.1.617.2). This new variant of the virus had higher infectivity and caused more severe illness compared to the initial strain.[3] Unlike the first wave that affected the elderly population and those with co-morbid illness the second wave affected the younger healthy individuals. Also this new strain is more resistant to treatment and has increased mortality. India was devastatingly hit by the second wave mainly due to the overpopulation, frequent defying of social distancing norms, poorly executed containment strategies and insufficiency of health care facilities.[2]

The uncertainty regarding the future, frequent lockdowns, social isolation, fear associated with the infection, social discrimination and loss of livelihood have all contributed to the increase in the incidence of mental health disorders and suicide in the world including India.[4] In fact, many of the studies have labelled the pandemic as "*global psychological*

pandemic" due to psychological and emotional breakdown caused by it.[5,6] Czeisler *et al.* study from United states 2020.[7] reports that forty percent of cases have at minimum of one mental and behvioural health issue, which includes symptoms of anxiety or depressive disorder (30.9%), trauma and stress related disorder related to pandemic (26.3%) and has started with substance use to relive stress and emotions related to COVID-19 (13.3%) Similar results of higher psychological distress leading to increased mental health disorders in community population have also been reported by Bareeqa *et al* 2020,[8] from China, Salari *et al.* from India,[9] and Forte *et al.* 2020.[10] from Italy.

Psychiatric morbidities have also been observed in the COVID-19 survivors (i.e. those individuals who were discharged from the hospital after active phase of the infection is over). A study by Mazza *et al.* 2020,[11] from Spain observed the prevalence of twenty eight percent for Post-Traumatic Stress Disorder, thirty one percent for depression, forty two percent for anxiety, twenty percent for Obsessive Compulsion symptoms, and forty percent for insomnia in COVID-19 survivors after one month follow up.

Post-COVID-19 psychiatric disorders have been ascribed to both to the effect of immune mediated inflammatory process of the disease on various neurotransmitters as well as the memories of psychological trauma one experiences while in the hospital mainly linked with the social isolation, fear of illness and uncertainty about the future.[12] Digging up the biological theory of anxiety and depression, alteration in the immunological pathway especially increased low grade inflammation in body has been linked to the development of both these disorders.[13] Infection with COVID-19 virus in an individual leads to a state known as cytokine storm with increase in IL(Interleukin), IFN-γ, (Interferon gamma), TNF (Tumor Necrosis Factor), chemokines and plasma proteins including complement and C-reactive protein (CRP) which alter the metabolism of tryptophan causing anxiety and depression.[14] Another theory links the kynurenine (KYN) pathway activation by COVID-19 cytokine storm and angiotensin-converting enzyme 2 (ACE2) receptor effects in increased risk for depression.[15] The psychological trauma due to COVID-19 infection activates the stress pathway in body leading to changes in hypothalamic-pituitary-adrenal (HPA) axis and sympathetic nervous system (SNS) which increases the risk for anxiety and depression.[16]

While there are many studies exploring the prevalence of various psychiatric disorders in either patients ever affected by COVID-19 infection or community dwelling non COVID-19 affected individuals a very limited studies are there actually comparing the psychiatric morbidities in these two populations especially from north India. Our study is an attempt to compare stress, anxiety and depression in the patient affected by COVID-19 as well as non-COVID-19 individuals.

METHODOLOGY

This study employed a cross-sectional design and was conducted through a portal for online survey. The study was reviewed and cleared by the Institute Ethics Committee of Swami Rama Himalayan University of Dehradun, India. Because the survey was performed during and after lockdown, requests for responses were issued by e-mail, an online chat platform, or a group post on social media. After acquiring written informed permission, study participants were recruited. Because the survey was confidential, the individuals' privacy was protected at all times. Involvement in the study was entirely voluntary, and individuals could withdraw their permission at any moment up to the final submission.

 Subjects were only allowed to participate in the study provided they met all of the following requirements.[1] All participants gave written informed consent to participate in the study, and,[2] all subjects could read and reply to questionnaires in English. If any of the respondents had a

history of serious mental illness, they were excluded from the study. The recruitment of the subjects was concluded at the end of second wave in India.

The reason behind this decision was considering the significant relaxation provided by the Government of India in the restrictions surrounding the lockdown. By the end of this period, we had obtained 269 responses.

The tools for this study included the following.[1] Sociodemographic proforma: the proforma included details such as age, gender, family monthly income, and employment status. No data that can lead to identification of the patient were included. Unemployment was defined in accordance with Cambridge English Dictionary as a situation of not having a job that provides money.[2] Fear of COVID 19,[17] scale was used, it is a seven question questionnaire. The minimal rating feasible for every query is 1, and the most is 5. The scale is utilized in sufferers who've COVID contamination, and who doesn't have or had COVID contamination and who had recovered from COVID, are absolutely or in part vaccinated.[3] DASS 21,[18] The Depression, Anxiety, and Stress Scale - 21 Items (DASS-21) is a collection of three self-report measures that assess depression, anxiety, and stress. Each of the three DASS-21 scales has seven items that are split into subscales that have comparable content. Summing the scores for the relevant categories yields depression, anxiety, and stress scores.

The analysis of the data was done using SPSS version 23. The data were initially analysed using descriptive statistics. The variable fear of COVID score was not normally distributed in different groups of age, marital status, education, occupation thus, non-parametric tests kruskal wallis test were used to make group comparisons. Wilcoxon -mann-whitney u test was used for variables such as gender, health worker, involved in essential services, working from home, financial loss, ever infected with covid. Non-parametric tests (spearman correlation) were used to explore the correlation between time since covid infection (months) and covid score.

RESULTS

In our study, overall 269 subjects had completed the survey after providing written informed consent. The description of various sociodemographic and clinical data is given in Table 1. The mean age in years was 31.13±10.30. On marital status of people it was found that most of them were never married which was 62.1%. 51.3 percent of cases have highest level of education as graduates and 55.4% were employed. There were 36.4% of health workers and 36.1% were involved in other essential services. 38.7% were working from home and 41.6% had financial loss (Table 1). There were 102 patients recovered from COVID, while 167 never had covid. The mean of time lapsed after covid infection is 6.48 ±2.45 months. Socio-demographical comparison between covid affected and covid non affected group shows no significant difference in any of the variables in the two group (Table 2).

The mean of Fear of COVID score was 18.68±7.49 in COVID recovered individuals and it's 16.05±7.81 in COVID unaffected individuals (Figure 1). When we tried to find relation between COVID recovered with unaffected individual by Wilcoxon-Mann-Whitney U Test the *p* value 0.004 suggesting significantly higher fear of covid in the covid affected group (Table 2).

On DASS 21 score of depression the mean score in covid recovered was 7.57±6.10 and 7.68±6.62 in COVID unaffected individuals and on Wilcoxon-Mann-Whitney U Test the *p* value was 0.876, suggesting no significance. On DASS 21 score of Anxiety the mean score in covid recovered group was 11.30±5.87 and mean score in covid unaffected group was 9.45±6.33 and on Wilcoxon-Mann-Whitney U Test the *p* value is 0.009, which shows a significant association of anxiety with

Table 1: The Socio-demographic and Clinical Details of the Recruited Subjects.

Basic Details	Mean ± SD or Frequency (%)
Age (Years)	31.13 ± 10.30
Gender	
Male	173 (64.3%)
Female	96 (35.7%)
Marital Status	
Never Married	167 (62.1%)
Married	97 (36.1%)
Divorced	3 (1.1%)
Widowed	2 (0.7%)
Education	
No Formal Education	2 (0.7%)
High School	9 (3.3%)
Intermediate	17 (6.3%)
Graduate	138 (51.3%)
Post Graduate	103 (38.3%)
Occupation	
Employed	149 (55.4%)
Unemployed	103 (38.3%)
Homemaker	12 (4.5%)
Retired	5 (1.9%)
Health Worker	98 (36.4%)
Involved In Essential Services (Yes)	97 (36.1%)
Working From Home (Yes)	104 (38.7%)
Financial Loss (Yes)	112 (41.6%)
Ever Infected with COVID (Yes)	102 (37.9%)
Time Since COVID Infection (Months)	6.48 ± 2.45
Ever In Quarantine	
No	193 (71.7%)
Home	70 (26.0%)
Hospital	6 (2.2%)
Vaccinated	
No	111 (41.3%)
One shot	73 (27.1%)
Both Shot	85 (31.6%)

Table 2: socio-demographic variables and their association with COVID affected and non- affected individual.

Parameters	Ever Infected with COVID		p value
	Yes (n = 102)	No (n = 167)	
Age Group			0.339[1]
18-30 Years	63 (61.8%)	105 (62.9%)	
31-40 Years	25 (24.5%)	28 (16.8%)	
41-50 Years	9 (8.8%)	22 (13.2%)	
51-60 Years	3 (2.9%)	10 (6.0%)	
61-70 Years	2 (2.0%)	2 (1.2%)	
Gender			0.529[2]
Male	68 (66.7%)	105 (62.9%)	
Female	34 (33.3%)	62 (37.1%)	
Marital Status			0.093[1]
Never Married	59 (57.8%)	108 (64.7%)	
Married	41 (40.2%)	56 (33.5%)	
Divorced	0 (0.0%)	3 (1.8%)	
Widowed	2 (2.0%)	0 (0.0%)	
Education			0.968[1]
No Formal Eductation	1 (1.0%)	1 (0.6%)	
High School	3 (2.9%)	6 (3.6%)	
Intermediate	6 (5.9%)	11 (6.6%)	
Graduate	55 (53.9%)	83 (49.7%)	
Post Graduate	37 (36.3%)	66 (39.5%)	
Occupation			0.515[1]
Employed	55 (53.9%)	94 (56.3%)	
Unemployed	38 (37.3%)	65 (38.9%)	
Homemaker	7 (6.9%)	5 (3.0%)	
Retired	2 (2.0%)	3 (1.8%)	
Health Worker (Yes)	40 (39.2%)	58 (34.7%)	0.458[2]
Involved In Essential Services (Yes)	34 (33.3%)	63 (37.7%)	0.467[2]
Working From Home (Yes)	37 (36.3%)	67 (40.1%)	0.530[2]
Financial Loss (Yes)	37 (36.3%)	75 (44.9%)	0.163[2]
Time Since COVID Infection (Months)	6.48 ± 2.45	-	-
Ever In Quarantine*			<0.001[1]
No	53 (52.0%)	140 (83.8%)	
Home	46 (45.1%)	24 (14.4%)	
Hospital	3 (2.9%)	3 (1.8%)	
Vaccinated			0.138[2]
No	48 (47.1%)	63 (37.7%)	
One shot	21 (20.6%)	52 (31.1%)	
Both Shot	33 (32.4%)	52 (31.1%)	
Fully Vaccinated (Yes)	33 (32.4%)	52 (31.1%)	0.835[2]
Current COVID (Yes)	3 (2.9%)	3 (1.8%)	0.676[1]

COVID recovered cases (Figure 2). On DASS 21 score of stress the mean score in covid recovered group was 11.30±5.87 and mean score in covid unaffected group was 8.97 ± 5.56 and on Wilcoxon-Mann-Whitney U Test the *p* value is 0.105, suggestive of no significance (Table 3).

The DASS 21 score of depression correlation with fear of COVID scale, the correlation coefficient (rho) was 0.29 and p value was less than 0.001 (Figure 3). DASS 21 score of Anxiety correlation with fear of covid scale the correlation coefficient (rho) was 0.42 and p value was less than 0.001 (Figure 4). DASS 21 score of stress correlation with fear of covid scale the correlation coefficient (rho) was 0.36 and p value was less than

Table 2: socio-demographic variables and their association with COVID affected and non- affected individual.

| Parameters | Ever Infected with COVID | | *p* value |
	Yes (*n* = 102)	No (*n* = 167)	
Currently Qarantined			0.511[1]
No	97 (95.1%)	162 (97.0%)	
Home	5 (4.9%)	5 (3.0%)	
DASS-21 Score: Depression	7.57 ± 6.10	7.68 ± 6.62	0.876[3]
DASS-21 Score: Anxiety***	11.30 ± 5.87	9.45 ± 6.33	0.009[3]
DASS-21 Score: Stress	10.09 ± 5.33	8.97 ± 5.56	0.105[3]
DASS-21 Severity: Depression			0.840[1]
Normal	67 (65.7%)	106 (63.5%)	
Mild	14 (13.7%)	21 (12.6%)	
Moderate	21 (20.6%)	38 (22.8%)	
Severe	0 (0.0%)	2 (1.2%)	
DASS-21 Severity: Anxiety***			0.005[2]
Normal	26 (25.5%)	79 (47.3%)	
Mild	8 (7.8%)	14 (8.4%)	
Moderate	33 (32.4%)	35 (21.0%)	
Severe	27 (26.5%)	26 (15.6%)	
Extremely Severe	8 (7.8%)	13 (7.8%)	
DASS-21 Severity: Stress			0.515[2]
Normal	77 (75.5%)	135 (80.8%)	
Mild	19 (18.6%)	26 (15.6%)	
Moderate	6 (5.9%)	6 (3.6%)	
DASS-21: Depression	35 (34.3%)	61 (36.5%)	0.713[2]
DASS-21: Anxiety ***	76 (74.5%)	88 (52.7%)	<0.001[2]
DASS-21: Stress	25 (24.5%)	32 (19.2%)	0.298[2]
COVID Score***	18.68 ± 7.49	16.05 ± 7.81	0.004[3]

***Significant at *p*<0.05, 1: Fisher's Exact Test, 2: Chi-Squared Test, 3: Wilcoxon-Mann-Whitney U Test.
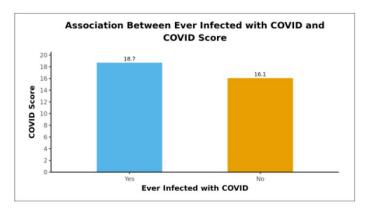

Figure 1: Association between covid recovered people and COVID unaffected people with fear of covid score.

Table 3: Relationship between COVID affected and non-affected individual and DASS 21 Scale.

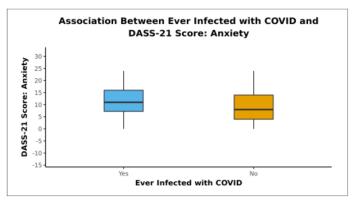| Parameters | Ever Infected with COVID | | |
	Yes (*n* = 102)	No (*n* = 167)	
DASS-21 Score: Depression	7.57 ± 6.10	7.68 ± 6.62	0.876[3]
DASS-21 Score: Anxiety***	11.30 ± 5.87	9.45 ± 6.33	0.009[3]
DASS-21 Score: Stress	10.09 ± 5.33	8.97 ± 5.56	0.105[3]

Figure 2: Association of ever infected COVID and DAss21 score : Anxiety

Table 4: Relationship between fear of COVID and DASS scale.

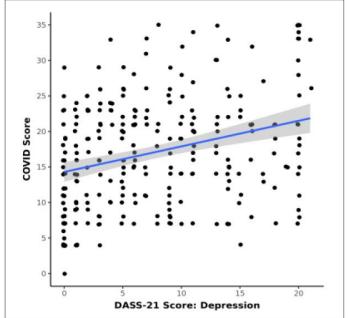| Parameters	COVID Score	*p* value
DASS-21 Score: Depression***	Correlation Coefficient (rho) = 0.29	<0.001[1]
DASS-21 Score: Anxiety***	Correlation Coefficient (rho) = 0.42	<0.001[1]
DASS-21 Score: Stress***	Correlation Coefficient (rho) = 0.36	<0.001[1]

Figure 3: Relationship between fear of COVID fear of COVID and DASS and DASS scale subscale depression.
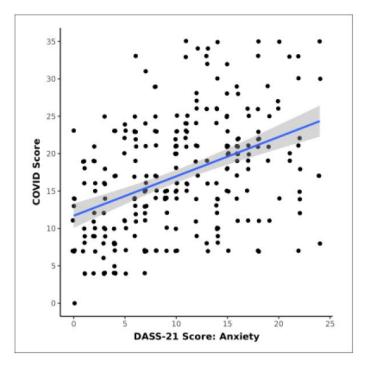
Figure 4: Relationship between fear of COVID and DASS scale subscale anxiety.
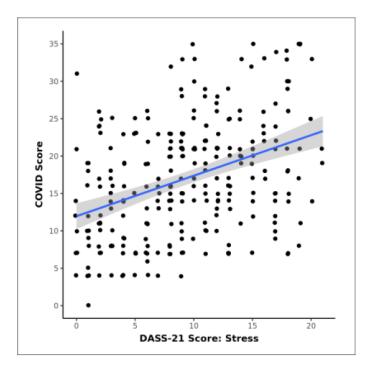

Figure 5: Relationship between fear of COVID and DASS scale. Subscale stress.

0.001(Figure 5). This shows that all the subscales of DASS 21 scale had a significant association with fear of COVID scale. (Table 4).

DISCUSSION

Table 6: Comparison of the 3 Subgroups of the Variable Vaccinated in Terms of COVID Score (*n* = 269).

Covid Score	Vaccinated			Kruskal Wallis Test	
	No	**One shot**	**Both Shot**	**χ2**	***p* value**
Mean (SD)	19.63 (7.94)	16.75 (7.74)	13.93 (6.37)	25.810	<0.001
Median (IQR)	20 (14-25)	17 (10-21)	14 (8-19)		
Range	0 - 35	4 - 35	4 - 33		

Pairwise Comparison of Subcategories of Vaccinated	Adjusted *P* Value
Both Shot - No	<0.001
Both Shot - One shot	0.069
No - One shot	0.042

Post-Hoc pairwise tests for Kruskal-Wallis test performed using Dunn Test method with Sidak correction.

The people who had COVID infection reported of increase in COVID related fear than the people who haven't got any COVID infection .There are not many study on this topic so we would like to put forward our conclusion that when people were in hospital or home quarantine it leads to worsening of fear related to COVID. Quarantine is separating and restraining the person's movement to reduce the spread of infection and for COVID it is for 2 weeks.[19] The people who had already had quarantine are subjected to separation from loved ones, loss of freedom, uncertainty of disease status, and boredom.[20] There are also some people who have witnessed death specially in a hospital which may have caused trauma to patients and many people have lost their loved ones which is a cause of depression , stress and anxiety among the subjects . With all the above factors we can conclude by this that the increase in COVID fear in people already infected with covid is natural. Our study is in concordance with review done on COVID survivors by brooks *et al.* which concludes that there are psychological impact on COVID survivors.[20]

We found that there was a significantly higher score on DASS 21 anxiety subscale among People recovered from COVID versus people unaffected by COVID. We did not find any significant difference in the depression and stress subscale of DASS 21 among the two groups studied. It can be proposed that insecurities and fear related to death and future may have led to increased anxiety among covid survivors. However we need further studies to understand causalities of other psychiatric morbidities among covid survivors.

We would like to report that in all the subjects the COVID fear has increased the anxiety, depression and stress on DASS 21 score among the population. It implies that fear of covid leads to increase in incidence of depression, anxiety and stress among subjects. This is in concordance with multiple other studies done elsewhere. Salari *et al.* reported in his metanalysis in 2020, that there was increased prevalence of depression, anxiety and stress among general population due to covid.[9]

We found that the mean COVID score was higher in people who were not involved in the essential health services (18.48) compared to those involved in essential health care services. This finding was statistically significant (*p* <0.001) (Table 5). This might be attributed to the fact that those involved in essential health care work were the first ones to be vaccinated under the Covid 19 vaccination programme launched by Ministry Of health and family Welfare, Government of India on January 16th 2021.[22] Also the misconceptions related to Covid 19 were less and

Table 5: Comparison of the 2 Subgroups of the Variable Involved in Essential Services in Terms of COVID Score (n = 269).

Covid Score	Involved in Essential Services		Wilcoxon-Mann-Whitney U Test	
	Yes	No	W	p value
Mean (SD)	14.52 (6.46)	18.48 (8.11)	6046.000	<0.001
Median (IQR)	14 (9-21)	18.5 (12-24)		
Range	4 - 30	0 - 35		

the level of precaution related to prevention of Covid 19 was higher in the essentials health care workers compared to the general population.

We also found that mean of COVID Score was lesser in subjects who had received double dose (13.93) of vaccination compared to those who had received single dose (16.75) or no dose (19.63) which was statistically significant (*p* <0.001) (Table 6). This finding is related to the mass awareness campaigns spread by the government,[21] related to the safety and efficacy of COVID-19 vaccine. A study by Pramod *et al.*[22] highlights the findings of higher vaccination effectiveness not only in those who got double dose of vaccination compared to those who got single dose but also in those who had moderately severe disease in improving the disease outcome.

CONCLUSION

During the COVID-19 pandemic, mental health disorders have become a severe issue. The current cross-sectional study sheds light on the psychopathological problems of both community dwelling non-COVID-19 affected individuals as well as people who recovered from COVID-19. This study not only gives an idea about anxiety, depression, and stress among both these population but also about their fear related to COVID. While the people have survived COVID infection, this trauma will always be there in people's minds, which require not only psychological support but also proper rehabilitation strategy and medical treatment. The future guidelines regarding the management psychiatric disorder in covid times should be made keeping in mind our findings.

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