A correlational study on physical and mental status of lived experience of hospitalised COVID-19 patient.

Mr. Amit V. Kadu[1], Dr. Neeraj J. Karandikar[2], Smt. Chanu Bhattacharya[3]

[1]Assistant Professor, [3]Principal, DVVPF's College of Nursing, Ahmednagar-414111, Maharashtra, India

[2]Associate Professor, Department of Psychiatry, DVVPF's Medical College & Hospital, Ahmednagar-414111, Maharashtra, India

Corresponding Author: Dr. Neeraj J. Karandikar

Email ID: karandikarneeraj@gmail.com

Address: Department of Psychiatry, DVVPF's Medical College & Hospital, Ahmednagar-414111, Maharashtra, India

Abstract :

Background: Some of the public health measures necessary to contain the spread of the pandemic, such as quarantines and social distancing, increase the risk of adverse psychological consequences. A recent review revealed that these risks are greater with longer quarantine periods, when there are infection fears, frustration, boredom, inadequate supplies, inadequate information, and financial loss. COVID-19 pandemic to have disproportionately adverse impacts on mental health of hospitalized groups. COVID-19 is a disease, impact physically but it has been affecting much more the mental health of patient. **Aim & Objectives:** To Assess physical and mental status of patient during hospitalization and the correlation. To find out the relationship between selected socio-demographic status Age, gender, race, ethnicity, employment, insurance, education, marital status, psychiatric therapies, health literacy, social support, financial distress with the level of mental status. **Methods:** A cross sectional study with one centre data, collected with selected criteria. Fifty participants were selected for collection of livid experience expressed in local language. Study approach was mix method and Qual-quan design. Assessed by experts and evaluators. Quantitative data collected with checklist and socio demographics detail were collected from patient. **Results:** Result showed Qualitative themes clearly showed the mental state of patient like "I will die". Quantitatively Physical status is significantly correlated with mental status, there is a significant statistical co-dependency assessed by Pearson's product moment test. Socio-demographic data age as chai square value physical status (4.54) as mental status (4.59), marital status (5.25) and social support (4.87) is significantly associated with mental status, test done in 0.05 level of significance. **Conclusion:** Though one centre data is a limitation of the study still it can be visible that COVID -19 patients need mental healing or therapy parallelly with medicines. The mental symptoms should not be secondary cure it must be primary for healing of body.

Key words: COVID-19 Patients, Hospitalized, lived experience, Physical Mental status.

Introduction:

COVID-19 pandemic to have disproportionately adverse impacts on the mental health of hospitalized groups. COVID-19 is a disease, impact physically but it has been affecting much more the mental health of the patient. This experience of hospitalization only trigger of affecting mental health, which might create a life-long mental health challenge for the patient, if survived. Among all the age group of patients, symptoms of anxiety disorder in adults 18 and older rose from 30.8% to 36.1% and symptoms of depressive disorder from 23.5% to 29.6%. To help compare these numbers to "normal" conditions, the NCHS found in its National Health Interview Survey last year that during January-June 2019, 8.2% of adults 18 and over in the U.S. had symptoms of anxiety disorder and 6.6% had symptoms of depressive disorder.[1] In India, specifically patient population from rural background also belong to economically weaker community, upset emotionally by the thought of huge financial burden of the disease, if the patient is the only earning member of the family effect increase many more folds, might leads to depression, hopelessness, guilt and suicidal ideas Socially disadvantaged groups have experienced the financial consequence of the pandemic more immediately and severely than their socially advantaged. COVID -19 created a set mental stress probably not related with physical symptoms, strange and unknown future.

Previous disasters and public health emergencies, however, propose that socially disadvantaged groups (e.g., racial/ethnic minorities, people with low income) will experience more psychiatric morbidity related to the pandemic than socially advantaged groups.[2] While low-income groups have higher rates.[3] There are specific aspects of the COVID-19 pandemic that could cause it to have disproportionately adverse impacts on the mental health of racial/ethnic minorities as well as low-income population. This Commentary highlights two of these aspects—financial insecurity and grief—and depicts the COVID-19 pandemic from a mental health equity perspective. Actual Sources of this stress are economic insecurity (e.g., jobless, inadequate money to meet daily needs) as well as the perceived threat of financial insecurity (e.g., fear of job loss), with some evidence suggesting that the latter is more detrimental. Socially disadvantaged groups have experienced the financial ramifications of the pandemic more immediately and severely than their socially advantaged counter parts.[4] The goal is to orient future psychiatric research about mental health equity and COVID-19, and extend discourse about the disparate impacts of the pandemic. The domain of mental health. The issues which are identified are likely applicable to other developed countries with high levels of social and economic income inequality.[5]

Aim of the study was to include qualitative rich text data to enquire the patient's livid experiences in their own expression instead of researchers own structured data to verify true mental status. Mental status is personal perception and human expression is a valid proof. Researcher used mixed method which are strong evident of mental condition might not match with general COVID physical symptoms in the beginning of the disease and even in the decline of the disease.

Objective:

1. To assessment of mental status of hospitalized COVID-19 patients through lived experiences.

2. To Assess of physical status of COVID-19 patient during hospitalization.

3. To find out the correlation between physical and mental status

4. To find out the association and relationship between selected socio-demographic status Age, gender, race, ethnicity, employment, insurance, education, marital status, psychiatric therapies, health literacy, social support, financial distress with the level of mental status

Research Hypotheses: (All hypotheses will be tested at 0.05 level of significance)

1.H_0: There will be no significant association between selected socio-demographic status Age, gender, race, ethnicity, employment, insurance, education, marital status, psychiatric therapies, health literacy, social support, financial distress with the level of mental status

Material & Methods:

Qualitative research is an effort to understand situations in their uniqueness as part of a particular context and the interactions there (Patton, 1985). A second characteristic of all forms of qualitative research is that the researcher is the primary instrument for data collection and analysis.

Methodology: Mix- Method research, QUAL-quan design

Research Approach: Quantitative and Qualitative analytical survey approach.

Type of Study design: Cross sectional survey

Study variables: Physical status, mental status, lived experiences of COVID -19 Patients.

Setting (Location of study): Selected COVID care Hospital established during COVID pandemic period AUGUST 2020, provides 24 x 7 medical services as under -general, isolation.

Study population: 549

Sample size: 50

Sampling technique: Purposive sampling technique.

Duration of study: Analytical period: 2 months

Method of sample selection: All the patient fulfilled selection criteria

Inclusion criteria:

1. All the Patient from selected time period

2. COVID -19 Patients must have power to understand the langwedge and answer.

3. Not in critical or severe respiratory distress/ventilator

4. Age14 to 90 years

5. Students of medical and paramedical courses

6. Any gender.

Exclusion Criteria:

1. Doctors, nurses and physiotherapists and other technical professionals on job or interns.

2. Laboratory staffs, helpers and assistances on job

Withdrawal Criteria: The participants can leave the study any time during study period without any explanation or penalty. No need to pay back benefit received from the study.

Operational Definition:

1.Lived experiences: I this study it is explored and understood in qualitative reply of patients. It is representation and understanding of a researcher or research or research subjects human experiences, choices and options and how those factors influences ones perception of knowledge.

2.Physical status: In this study Physical condition expressed by the patient. Assessed quantitively its presence and intensity as expressed by patient as 1. Markedly unwell,2. unwell,3. better and 4. well and scored respectively Very high=9-11, High=6-8, moderate = 3-5 and low as 0-3.

3.Mental status: In this study mental status assessed by a short interview with six questions by local language, patients expression recorded that is unstructured rich data was lived expressions and number of responds was and assessed by quantitative way, mental problem present " Yes Always" or " No Never", if not mental problem was not present. If Yes its intensity assessed like if six problem present always scored maximum, if no mental problem it is scored as normal mental state.

Tools & Technique:

Section A:

Socio Demographic Profile

Section B:

1) Physical Assessment Checklist (Self reporting)

2) Mental state assessment scale.

3) Unstructured interview scheduled on lived experiences of COVID -19 Patients.

Data Collection Procedure:

Investigator collected data from each sample participants separately as they admitted hospital and end of acute condition like (Respiratory distress). After explaining the study Physical states assessed by a) Self reporting Physical assessment checklist (Where condition agreed by patient) then after 10 minutes Mental state assessment checklist were provided which had (12 item). Patient express about 6 problems separately through unstructured interview scheduled. Each participant expresses their feeling taken at least 30 to 35 minutes which needed in between rest and support. Each day's 1 to2 patient's data only collected. Data collection needed 60 days as for qualitative data. Data collected and saturation was observed. Data saturation was observed after 9 to 10 patients but qualitative data collection done completely for 50 patients. Because of the quantitative assessment and better care for the patient communication continued till 50 patients completed.

Observation & Results:

Qualitative research is an effort to understand situations in their uniqueness as part of a particular context and the interactions there (Patton1985). A second characteristic of all forms of qualitative research is that the researcher is the primary instrument for data collection and analysis.

Demographic Data:

Table 1: Assessment of Demographic profile (n=50)

| Sr. No.	Parameter	Frequency	Percentage
1	**Age**		
1.1	11 To 20	1	2
1.2	21 To 30	7	14
1.3	31 To 40	12	24
1.4	41 To 50	6	12
1.5	51 To 60	10	20
1.6	61 & Above	14	28
2	**Gender**	**Frequency**	**Percentage**
2.1	Male	38	76
2.2	Female	12	24
3	**Employment**	**Frequency**	**Percentage**
3.1	Farming	17	34
3.2	Job	21	42
3.3	Marketing	2	4
3.4	Housewife	3	6
3.5	Unemployed	7	14
4	**Marital status**	**Frequency**	**Percentage**
4.1	Married	46	92
4.2	Unmarried	4	8
5	**Health Literacy**	**Frequency**	**Percentage**
5.1	literate	42	84
5.2	Illiterate	8	16
6	**Social Support**	**Frequency**	**Percentage**
6.1	Yes	42	84
6.2	No	8	16
7	**Financial Support**	**Frequency**	**Percentage**
7.1	Yes	4	8
7.2	No	46	92
8	**Health Insurance**	**Frequency**	**Percentage**
8.1	Yes	2	4
8.2	No	48	96
9	**Education**	**Frequency**	**Percentage**
9.1	Educated	41	82
9.2	Uneducated	9	18
10	**Psychiatric Therapy**	**Frequency**	**Percentage**
10.1	Yes	0	0
10.2	No	50	100
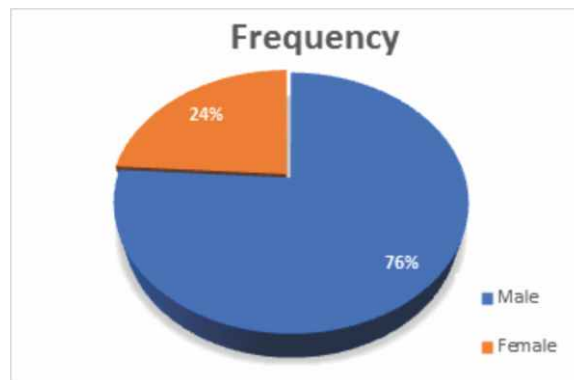
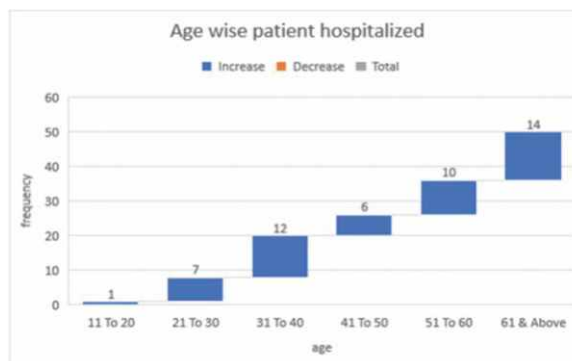**Fig 1:** Average age of male =52.7 & female=45.1

Fig 2: Age wise patient hospitalized

Assessment of mental status of hospitalized COVID-19 patients through lived experiences.

Parallel sequences of Qualitative Data:

Researcher has given more important on qualitative "lived experiences" of hospitalizes subjects and the situation of COVID positive physical status. The qualitative expression of patient data tabulized in a manner and recorded. Data saturation was detected after second two third patients. Data was generated and theme detected accordingly.

1. Worry and anxiety about family and social stigma or social rejection

2. Fear of death

3. Uncertainty about future, negative thoughts and feelings

4. Guilt and loneliness

5. Bargaining with God

6. Family responsibilities and family's responsibilities towards patient

Table 2: Data From qualitative data theme generated by intense analysis about mental state data saturated (n=50)

Subjective data	Worried about family Social stigma	Fear of death	Tensed about future	Guilt and loneliness	Bargaining with god	Family responsibilities
1	I was feeling like this community pushed me out due to COVID	If I am covid positive, I will definitely die.	Now what will be my situation and afterwards what will be my future.	I am thinking like that, my infection nobody should suffer.	I am thinking that, God only shoul d recover me fast.	If anything happened to me, who will look after my family and my small son.
2	I was warried about my home.	If I am positive, I will definitely die.	Very negative (Vichitra) thoughts are coming.	I was lonely and confused about future.	I don't want to do anything.	I have responsibility for my family.
3	At the end I will recover or not? or I will die	I am stressed and worried but controlling myself.	Due to the symptoms I was worried but after taking medication I feel better now.	From beginning was loneliness but after using mobile phone feeling better now.	I don't want to do anything	I have responsibility for my family
4	I was warried about my home.	I was stress and worried but contr olled myself with medication.		From beginning was loneliness but after using mobile phone feeling better now.		Due to much responsibility I am worried.
5	I was warried about my family.	If I am covid positive, I will definitely die.	I think that, when I will recover and I will go home	Feeling lonely.	Feeling restlessness and fearful.	My family memories were disturbing me off and on.
6	I was warried about my home.	I was scared when they will put me in the ICU.	Very negative and strange thoughts are coming	Feeling lonely.	I was unable to do anything.	I have responsibility of my family.
7	I was warried about my home.	If I am positive, I will definitely die.	I should recover very fast	Feeling lonely	I don't want to do anything.	My family definitely have my responsibility.

Qualitative and quantitative data merged in the final stage and result concluded

1. Physical status perceived by patient is related with mental state

2. Physical and mental state is inseparable and need professional attention

3. After physical cure also mental state persists

4. For some subject mental state worsen physical healing process

5. Worry and anxiety create restlessness, agitation and psychological death fear

6. Physiological balance disturbed by continuous negative thoughts and feelings

7. Data related mental state supports physical state and a mental crisis situation

8. Psychosis like mental state creates a kind of fear, especially future and death.

Table 3: Assessment of physical status (n=50)

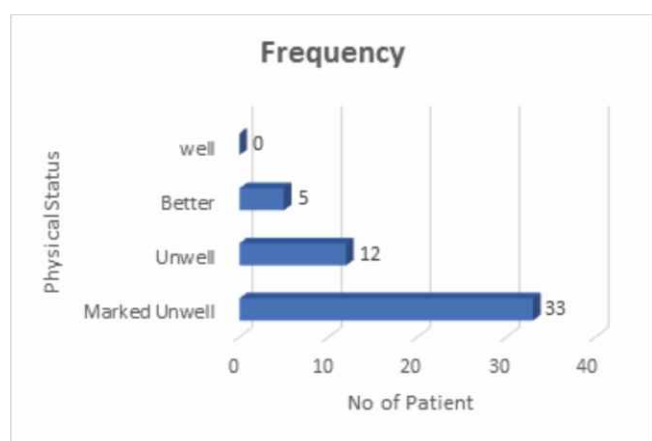| Sr. No.	Physical Status	Frequency	Percentage
1	Marked Unwell	33	66
2	Unwell	12	24
3	Better	5	10
4	well	0	0

Fig 3: Level of physical problem

Table 4: Assessment of Mental Status (n=50)

Sr. No.	Mental distress	Frequency	Percentage
1	VH	20	40
2	H	3	6
3	M	15	30
4	L	12	24

Table 5: Finding related correlation between physical and mental status (n=50)

Physical status	Mental status	Correlation
33	20	
12	3	significant
5	15	+ r
0	12	

p- value 0.5 and 0.96 confidence

Table 6: Association between physical status and mental status of selected socio demographic variables (n=50)

Sr. No.	Variables	Physical Status		Mental Status	
		X^2 Value	Level of significance	X^2 Value	Level of significance
1	Age	4.54	Significant	4.59	Significant
2	Gender	0.56	Not significant	1.58	Not significant
3	Employment	1.96	Not significant	2.87	Not significant
4	Marital Status	2.52	Not significant	5.25	Significant
5	Health literacy	0.86	Not significant	1.20	Not significant
6	Social support	2.52	Not significant	4.87	Significant
7	Financial support	1.65	Not significant	0.85	Not significant
8	Health insurance	0.48	Not significant	0.69	Not significant
9	Education	0.84	Not significant	1.45	Not significant
10	Psychiatric therapy	1.26	Not significant	0.89	Not significant

Df=1, table value =3.84, $p > 0.05$

Discussion:

A survey conducted during the last week of March 2020 manifest that 72% of Americans felt that their lives were impacted by the outbreak, which was a 32% increase from the survey conducted only 2 weeks earlier. The results appear a positive correlation between COVID-19 infections/casualties and growing public concern. These observations suggest possible increase in mental health problem in United States as a consequence of the pandemic. The authors review a recently published model on COVID-19 related fear among the people. The fear of being infected or dying from the disease is one of the most significant causes of mental health disorders. Loss of employment or the fear of losing employment is another major concern leading to mental illnesses. Several new strategies to prevent or mitigate mental health problems are discussed.[6]

A current article shows that fear experiences during the pandemic may be modelled as a relationship between four interrelated dialectical domains such as: (i) fear of/for the body (ii) fear of/for significant others (iii) fear of knowing/not knowing (iv) fear of taking action/fear of inaction. In the following section, the authors discuss strategies that may be useful towards preventing/mitigating mental illnesses due to the above-mentioned fears.[7]

Some of the public health measures that may be necessary to contain the spread of the pandemic, such as quarantines and social distancing, may further increase the risk of adverse psychological consequences. A recent review revealed that these risks are greater with longer quarantine periods, and when there are infection fears, frustration, boredom, inadequate supplies, inadequate information, and financial loss.[8]

Some individuals may develop heightened somatic illness concern (i.e., Hypochondriasis) and experience physical symptoms that may mimic or be perceived as symptoms of aCOVID-19 infection.[9]

The novel corona virus, SARS-CoV-2-causing Corona virus Disease 19 (COVID-19), emerged as a public health threat in December 2019 and was revel a pandemic by the WHO in March 2020. Delirium, a dangerous untoward prognostic development, serves as a barometer of systemic injury in critical illness. The early reports of 25% encephalopathy from China are likely a gross underestimation, which we know occurs whenever delirium is not monitored with a valid tool. Indeed, patients with COVID-19 are at higher risk for delirium due to at least seven factors including direct central nervous system invasion, induction of CNS inflammatory mediators, secondary effect of other organ system failure, effect of sedative strategies, prolonged mechanical ventilation time, immobilization, and other needed but environmental factors including social isolation and quarantine without family. Given early insights into the pathobiology of the virus, as well as the emerging interventions used to treat the critical patients, delirium prevention and management will prove exceedingly challenging, especially in the ICU. The main focus during the COVID-19 pandemic will be organizational issues, i.e., less numbers of ventilators, shortage of PPE, resource allocation, prioritization of limited mechanical ventilation options, and end-of-life care.[10]

Survivors of intensive care unit patient stay commonly experience long- lasting mental health deterioration. Clinical symptoms of anxiety, depress mood and post trauma stress Prior studies of patient survivorship after an intensive care unit stay suggest that many critically ill patients with COVID-19 will face long time physical, cognitive and psychological impairments. This forecast survivorship experience high points the importance of combination between the fields of critical care and rehabilitation to optimize post- COVID-19 recovery patients.[11]

Post-traumatic stress disorder occur in one- quarter to one- third of survivors and persist for up to almost 5 years, with half of survivors reporting prolonged symptoms in at least one of these categories. Pre-existing psychological symptoms are associated with new or worsened post- ICU mental health morbidity, the severity of the physical and clinical is generally not associated with psychological outcomes. These findings suggest a need to screening of all patient for mental health impairments. COVID-19- related changes For instance, reduced. Access to family members, pleasurable activities and rehabilitation may result in anxiety and demoralization in patients. Contact isolation has been associated with increased symptoms of depression and anxiety, as well as fear and hostility towards medical providers.

Literature from prior outbreaks (for example, influenza a subtype H1N1 virus and Ebola virus) may provide insights for the current pandemic.[12]

While health care professionals and the government are preparing for health and financial aid for patients suffering from COVID19, they must also support the upcoming mental health needs. While the exact number of patients will be hospitalized for COVID19 is unknown, we do know if some of them will face death and that in it should be a reason enough to discuss the mental health needs of patients.[13]

Sociodemographic: Age, gender, race, ethnicity, employment, insurance, education, marital status, psychiatric therapies, health literacy, social support, financial distress. Currently acute infection with the severe acute respiratory syndrome novel coronavirus which leads to coronavirus disease 2019(COVID-19) is causing the largest pandemic of pneumonia, a key LIFT trial inclusion criterion, in over 100 years. It is expected thatCOVID-19 infection will likely place patients at even higher risk of distress than other forms of cardio respiratory illness given the global state of emergency and economic stress. The COVID-19 pandemic represents a unique threat to patient-centred care given new norms of 'social distancing,' limited healthcare resources that serve as barriers to distress assessment and timely treatment, and economic devastation of those impacted by it. Additionally, most research institutions have banned study staff from conducting clinical research that includes direct patient contact. These barriers require a novel approach that we believe can be effectively provided by LIFT.LIFT's 'touchless deployment' allows automated screening, consenting, intervention activation, and data collection without direct patient contact critical for successful enrolment of patients with and without COVID in this trial. Additionally, LIFT is a self-guided mobile app that works on any device, giving it the flexibility and scalability required in a pandemic. That said, refocusing our teams' focus on conducting clinical research that begins in a hospital setting presents numerous logistical, regulatory, and methodological challenges. [14]

Structural inequities have shaped racial, ethnic, and income disparities for the majority of these criteria. To date, there has been limited analysis of the proportion of the population that is at risk in the U.S. on the basis of these criteria, risk factors by race/ethnicity or income. Preliminary national data on cases by race/ethnicity suggest that disparities in hospitalization are already developing. Quantifying disparities in risk is important for allocating resources to prevent, identify, and treat COVID-19 related severe illness and limit diverging outcomes for already vulnerable subgroups. People who are black, American Indian, or live in low-income households are more likely to have conditions associated with increased risk of illness from COVID-19. Relative to those who are white or are living in higher income households. These inequities in risk are compounded by structural disparities in access to medical insurance, wealth, and income volatility. Structural inequities also contribute to heightened exposure to COVID-19. Minorities and people living in low-income households are more likely to work in industries that have remained open during nonessential business closures. They are also more likely to live in crowded conditions and multigenerational households that may elevate exposure and limit options for quarantining family members. It is vital that these race/ethnicity and income disparities in risk be considered in physical distancing policies and other protective measures, particularly for those who work in essential industries. Rationing resources based on co morbidities may exacerbate inequities, whereas prioritizing vaccine delivery on risks may reduce deaths and disparities.[15]

After controlling for potential explanatory factors which included neighbourhood deprivation, household crowding, smoking, body size, inflammation, were attenuated by 33% for Blacks, 52% for Asians and 43% for Other, but remained raised for Blacks (2.66;1.82, 3.91), Asian (1.43; 0.91, 2.26) and other non-white groups (1.41; 0.87, 2.31).There were clear ethnic differences in risk of COVID-19 hospitalisation and these do not appear to be fully explained by measured factors. If replicated, our results have implications for health policy, including the targeting of prevention advice and vaccination coverage. haemoglobin, and mental illness, these effect estimates COVID-19 might disproportionately affect people from ethnic backgrounds. (Kirby, 2020; Aldridge et al., 2020)

In the UK, inequalities in COVID-19 in prognostic studies have been reported such that, in cohorts of hospitalised patients, minority groups appear to have the greatest risk of progression to intensive care and death. (Williamsonet al., 2020).[16]

Conclusion:

Study revealed mental status of patients depends on physical status of patients or vice versa before hospitalization during the stage of screening and diagnosis COVID related counselling must start. The situation itself created a crisis for the patient and family. Hospitalized and quarantine period increases age wise social, marital and financial disturbances that leads to an uncertain future and psychosis like features. Patient will be much more confident in the hospital if they positive in thinking and feeling.

Ethical Aspects:

Ethical clearance: proposal presented in Institutional ethics committee and clearance obtained

Informed written consent: obtained from patient before data collection and study was explained, confidentiality assured

References:

1. Carmine Pariante, Kuan-Pin Su.Case Report: Immuno-psychiatry of COVID 19 pandemic, Brain, behavior and Immunity. (Special issue)OCT 13, 2020.

2. Jonnathan Purtle. COVID-19 and mental health equity in the United States. Soc Psychiatry Psychiatr Epidimiol, 2020:17(6):1-3doi: 10.1007/s00127-020-01896-8.

3. Jade Connor.et al.Health risks and outcomes that disproportionately affect women during the Covid-19 pandemic: A review. Soc Sci Med. 2020 Dec; 266: 113364. Published online 2020 Sep 13. doi: 10.1016/j.socscimed.2020.113364.

4. Alison Brunier.World Mental Health Day on 10 October to highlight urgent need to increase investment in chronically underfunded sector. WHO news release; 5 Oct: 2020.

5. WHO Newsletter, Looking after our mental health; October 2020.

6. OECD insight. Income inequality, how does income inequality affect our lives? OECD 2015.

7. Bhattacharya B, Acharya T.The COVID-19 Pandemic and its Effect on Mental Health in USA - A Review with Some Coping Strategies. Psychiatr Q; 2020 :91(4) 1135-45.

8. David Robson. Fear of Corona virus is changing our psychology.BBC.com web page (1): 2 April2020.

9. Alisha Arora, Amitkumar Jha, Priya Alat, Sitangshu Sekhar Das. Understanding corona phobia, Asian J Psychiatr; Published online 2020 Sep. doi: 10.1016/j.ajp.2020.102384.

10. Carlos Blanco, Melanie M Wall, Mark Olfson. Psychological aspects of the Covid-19 pandemic. J Gen Intern Med. 2020; 35(9): 2757-59.doi: 10.1007/s11606-020-05955-3.

11. Katarzyana Kotfis, Shwaniqua Williams Roberson, Jo Ellen Wilson, Wojciech Dabrowski. COVID-19: ICU delirium management during SARS-CoV-2 pandemic. Critical Care;2020;24(1) DOI: 10.1186/s13054-020-02882-x.

12. Hosey MM, Needham DM .Survivorship after COVID-19 ICU stay. Nat Rev dis Primers; 6(60) :2020. https://doi.org/10.1038/s41572-020-0201-1

13. Nagendrappa S, Moirangthem S, Desai G. Guidance for General Medical and Specialised Mental Health Care Settings : Simple Psychological Strategies to Deal with Common Mental Health Concerns in the 102 wake of COVID-19.2020.A19,102-7, Mental Health in the times of COVID-19 Pandemic Department of Psychiatry National Institute of Mental Health & Neurosciences (NIMHANS), Bengaluru, India.

14. Benjamin Williams. Pandemic perspectives: Smartphone Applications for psychological health. Psychiatry Advisor Blog, 22May 2020.

15. Mathew A Raifman, Julia R Raifman. Disparities in the Population at Risk of Severe Illness from COVID-19 by Race/Ethnicity and Income. Am J Prev Med. 2020 Jul; 59(1): 137–139. doi: 10.1016/j.amepre.2020.04.003.

16. Camille Lassale, Bamba Gaye, Mark Hamer, Katherine R Gale, G Devid Betty. Ethnic disparities in hospitalization for COVID-19 in England: The role of socioeconomic factors, mental health, and inflammatory and pro-inflammatory factors in a community-based cohort study. Brain, behavior and Immunity. 88 (2020) 44-9.