

# COVID-19 and its Implications on Mental Health: A Review

Udit Gupta, Komal Muneshwar\*, Ashok Mehendale

Department of Community Medicine, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, Sawangi, Wardha, Maharashtra, India

## ABSTRACT

*Background: On 11<sup>th</sup> of March in the year 2020, the novel Coronavirus (COVID-19) was declared as a pandemic by the world health organization. COVID-19 started as a zoo originally infection originating allegedly from the wet markets of the Chinese city of Wuhan. Although there is a large void of controversial opinions on how the virus originated, ranging from exotic mammals as harbouring reservoirs to lab leak theories pointing the finger at government agencies, there is a high degree of possibility that any of them could be true and this needs further investigation. What we are sure of however, is that there must be a collective effort from health care professionals and lay persons alike to mitigate the damages caused by the viral pandemic. There are widely reported cases of patients suffering from severe stress and PTSD like symptoms induced by hospitalization with COVID-19 or being taken ill by it severely. There is an urgent need to identify and resolve the primary causes and explain the pathogenesis for the same. As clinicians, the onus is on us to ensure that these patients are not suffering beyond their systemic complications and that they are in the best possible care system to deal with their mental anguish.*

**Key words:** COVID-19, Depression, Trauma, Mental health, Dyspnoea, Hospitalization

**HOW TO CITE THIS ARTICLE:** Udit Gupta, Komal Muneshwar, Ashok Mehendale, COVID-19 and its Implications on Mental Health: A Review, J Res Med Dent Sci, 2022, 10 (11): 063-068.

**Corresponding author:** Komal Muneshwar

**E-mail:** komalmuneshwar3@gmail.com

**Received:** 05-Sep-2022, Manuscript No. JRMDS-22-64177;

**Editor assigned:** 07-Sep-2022, PreQC No. JRMDS-22-64177 (PQ);

**Reviewed:** 25-Sep-2022, QC No. JRMDS-22-64177;

**Revised:** 07-Nov-2022, Manuscript No. JRMDS-22-64177 (R);

**Published:** 18-Nov-2022

## INTRODUCTION

Coronavirus disease 2019, also known as COVID-19, is a fatal illness that has been decimating the world for much more than almost a year and a half. On March 11<sup>th</sup>, 2020, the World Health Organization (WHO) declared the epidemic to be a Public Health Emergency of International Concern (PHEIC), one of the most regrettable declarations in past years. SARS-CoV-2 is the forerunner to SARS-CoV-1, which result the prior eruption of Severe Acute Respiratory Syndrome (SARS) in the early 2000's. Both these respiratory viruses are members of a certain Coronaviridae group. A further MERS-CoV eruption wreaked havoc by infecting people with middle eastern respiratory syndrome. It has dispersed at an alarming rate since its beginning in Wuhan, China's Hubei region. Everyone has felt the effects of the disease outbreak in one way or another. Huge numbers of people were afflicted with this pathogen, and regrettably, some of them died as a result of their infection.

Until December 10, 2021, a total of 268,343,207 infections had been reported globally, with 5,285,485 deaths occurring as a result of COVID-19 related abnormalities

[1]. The novel strain, which was discovered in the Southern regions of the African continent, has so far dispersed to distant parts, causing worldwide panic [2]. So far, people who are infected with the novel Coronavirus's Omicron version have revealed fewer complications such as mild muscle spasms, tonsil infection, and sore throat. Thirty sick people admitted to a South African clinic or hospital in the last ten days has complained of severe fatigue.

The preliminary data point to a milder expression, but serious and crucial manifestations cannot be ruled out at this preliminary phase [3]. Remarkably, even individuals who have not been immunized are experiencing minor side effects, but caution must be exercised because novel coronavirus is completely volatile. The main reason of high mortality rates among severe patients is interleukin storm. Various treatments have been used to suppress the inflammatory cascade, but they each have had their own set of adverse effects, so it is important to exercise caution when following a medical form of therapy with people [4].

## LITERATURE REVIEW

**Systemic effects and pathogenesis:** For more than two years already, the world has been experiencing a major medical crisis in the shape of COVID-19. Still, the impact of COVID-19 is not dwindling and is developing new difficulties and obstacles. Humanity was caught by surprise by the disease outbreak, which made a massive difference as even more than five million people died and

millions more were affected in some way by the COVID-19 disease outbreak. Not only medical but also economic and educational troubles were created as a result of the pandemic, which had a broad spectrum of impacts. This was due to the novel Coronavirus's unusual pathogenic mechanisms. It is a beta category Coronavirus and the most recent representative of the Coronaviridae group. In the mid-1960's, it was originally described as a regular, harmless cough and cold causing pathogen, primarily in European nations [5]. Where upon, for the next 40 years, no significant disaster or epidemic was caused by human Coronaviruses. However, at the turn of the last century, an undiscovered viral respiratory tract infection outbreak was defined as Severe Acute Respiratory Syndrome (SARS). This was induced by the highly pathogenic severe acute respiratory syndrome Coronavirus 1. (SARS-CoV-1) [6]. This incident sent shockwaves throughout the scientific community, and more and more studies focused on the behaviour of viruses. It was dormant until after 2012, when a Middle Eastern Respiratory Syndrome (MERS) epidemic occurred, which quickly contaminated many individuals but was ultimately restricted to small regional limits. This was later confirmed to be due to the Middle Eastern Respiratory Syndrome Corona Virus (MERS-COV). Then, based on the Coronavirus's pattern of behaviour, scientists predicted that it would proceed and that the pathogen would cause many such epidemics in the long term. Viruses are well-known for their genetic change, which retains them robust and potent. However, they can

only eventually evolve when inside the host because they are classified as a half living life form that only lights up when the host is present; alternatively, they are dormant [7-9]. As a result, it is critical to keep the pathogen apart from the host in done to avoid its propagation. Once infected, the virus begins its task effectively, and if the person's immune system is insufficient, the body will be unable to combat the viral infection, resulting in a crippling effect on health. The disease has a broad medical effect on human morphology [10]. The syndrome is defined patient's condition they experienced after being infected with a novel Coronavirus. The novel Coronavirus microbe can remain in the surrounding air as a hanging object and can bring back the accompanying airflow environments. The novel Coronavirus can build up in the body physiologic emission as well as entry points such as the nose, throat, and eyelids. The virus then travels down the mucous membranes, raising its Viremia. The ACE 2 receptors are the point of contact for the virus and facilitate its entry. The pathogen settles down for 3 to 10 days after the entrance, with COVID-19 symptoms appearing from around the fourth day. A wide range of manifestations can be observed in COVID-19 patients, and it all depends on the client's health history and the numeric weight of the pathogen that the person carries (Table 1) [11].

**Table 1: Different type of psychological disorder in the population.**

Disorders	Percentage of occurrence
Minor depressive episode	27.60%
Anxiety disorders	19.10%
Major depressive episode	8.40%
Posttraumatic stress disorder	3.60%
Bipolar disorder	2.80%
Obsessive compulsive disorder	1.90%
Borderline personality disorder	1.50%
Schizophrenia	<5%
Others	34%

Table state the different type of psychological disorder peoples have experienced while under lockdown and restrictions placed to reduce the spread of COVID-19 infection [7].

**Mental health and the COVID-19 pandemic:** Coronavirus emergency influences the actual well-being; it additionally harbours the seeds of a huge psychological wellness emergency assuming that move isn't made. Indeed, even in awesome of conditions, great psychological wellness is vital for the working of society. It must be at the forefront of each country's approach to and recovery from the COVID-19 outbreak. This dilemma has had a considerable influence on the mental health and well-being of entire populations, and it is a priority that can only be addressed as quickly as practical.

Psychological hardship is prevalent throughout populations. Many patients are concerned about a by-product of the virus's severe health effects and the implications of physical isolation [12]. Many individuals are unnerved by as yet being unwell, biting the dust, or passing on youthful. People have been disengaged from their friends and family, families, and companions. Individuals all around the world are frightened to lose their type of revenue and occupations misinformation and bits of gossip concerning the infection, just as profound worry about the disease's future, are normal causes of torment. In any case, because of the greatness of the issue, the extraordinary larger part of psychological wellness requests goes neglected. Preceding the scourge, there was a scarcity of interest in

psychological wellness advancement, avoidance, and care, which hindered the reaction. This notable under investment in psychological wellness should be redressed at the earliest opportunity to lighten incredible enduring among a huge number of people and diminish long haul social and financial expenses for society.

**The impact of COVID-19 on the mental health of frontline workers:** The next group of people that are significantly impacted by COVID-19 is police officers and healthcare personnel. Numerous articles stress the vital significance of self-care for these COVID-19 frontline personnel. Globally, governments have urged people to band together to follow strict public health measures in public places. However, there is a pressing need to learn how to support our frontline staff members and their families in using adaptive coping mechanisms both immediately and in the long run to improve pandemic readiness. The investigation of the causal and modifiable factors that can affect pandemic toughness has been advised to develop such interventions practically. Exercise, prosocial behaviour, conflict resolution, and peer group based therapies are a few examples of such elements. It will be necessary to properly provide frontline staff support once clear strategies have been defined, to guarantee that work ethic and morale are maintained. Healthcare professionals have repeatedly reported suffering, sadness, anxiety, and post-traumatic stress disorders, according to one study. Light depression was projected to be 36.1%, moderate anxiety to be 22.1%, mild anxiety to be 38.3%, and moderate PTSD to be 21.5%. Estimates for anxiety, including PTSD, and depression are significantly higher than would be expected for the general population under normal circumstances (depression: 4.4%; anxiety, including PTSD: 3.6%), which necessitates immediate attention to the significant psychological impact on healthcare professionals. The information is overwhelming in showing that people with psychiatric conditions are more likely to experience excess morbidity, early death, as well as detrimental effects on their ability to function in social, occupational, and educational environments [13].

Higher risk groups, such as healthcare workers and other front line professions, police officers, and members of the armed forces, may experience a great deal of worry, dread, and anxiety as a result of little known contagious illness epidemics like COVID-19. Exposure to COVID-19 cases in hospitals, being put under quarantine, losing a friend, relative, or patient to the virus, as well as enhanced self-perceptions of danger due to the virus's lethality, all can have a significant influence on a healthcare worker's mental health. Due to a dramatic rise in workload, inadequate infection control, frustration over not providing the best patient care possible, and isolation, medical workers in highly COVID-19 infected nations like China suffered significant performance pressure. There have been numerous psychologically stressful incidents among the nursing staff connected to "vicarious traumatization" during the transmission and containment of the COVID-19 epidemic in China. A rise in

COVID-19 cases is likely to immediately cause dread, annoyance, and tension among doctors and nurses in underdeveloped nations like India where the healthcare system is already overcrowded. The dearth of Personal Protective Equipment (PPE) among Health Care Professionals (HCPs), who are most at risk of transmission, and the dearth of basic hand hygiene supplies in hospitals could exacerbate this issue. Half of the respondents in their nationwide study of HCPs working in fever clinics or treating COVID-19 patients during the 2019 Coronavirus outbreak identified at least mild depression, and one-third reported insomnia, as opposed to 14% of doctors and nearly 16% of nurses who reported moderate or severe depressive symptoms. Addressing the psychological problems, such as the dread and worry of critically ill COVID-19 patients, appears to be even more challenging and time consuming because most hospitals lack rigorous training on efficient infection control methods. Due to the severe difficulty in treating the frightened, stubborn, scared, and stigmatized patients of COVID-19, clinicians may grow apathetic and disengaged. HCPs that are directly treating confirmed or suspected COVID-19 patients are being isolated and detained in large numbers. During an infectious disease outbreak, staying away from family can lead to HCPs going through a lot of mental stress [14]. People who work in hospitals on a day to day basis are more prone to experience extreme anxiety when they have to return home due to the risk of spreading the illness to their family members. This is particularly true if there are senior family members who have chronic illnesses and are more likely to suffer catastrophic and unfavourable consequences. Due to the lack of effective treatments and vaccinations, the virus's an unclear incubation period, and the possibility of asymptomatic transmission, physicians may begin to feel vulnerable. HCPs may experience significant burnout and withdrawal as a result of inadequate government support, a lack of PPEs, a sense of worthlessness as a result of inadequate training in infection control techniques, and isolation. These factors can lead to an increase in substance dependence behaviours and significant functional impairment. It has been alleged that resident physicians have been evicted from their rented homes amid the ongoing pandemic. Doctors have been assaulted following the deaths of COVID-19 patients. Following these shameful experiences and emotional breakdowns, both immediately and later, result in common psychiatric diseases. To address the labour shortages, the competency and mental health of newly employed fast tracked medical students and residents should also be carefully assessed. The HCPs' proper psychological health during this delicate period is crucial [15].

## DISCUSSION

**Actions to be taken to minimize consequences of the pandemic:** Firstly, use a global approach to promote, protect, and care for mental health and ensure psychological well-being mediations should be seen as basic parts of the public reaction to COVID-19. Reacting proactively to pandemic related difficulties known to

influence psychological well-being, like home grown maltreatment and outrageous destitution. Joining psychological wellness and psychosocial issues into public reaction methodologies across the key areas, like advancing learning and supporting settings for youngsters. Guaranteeing that emotional stability is remembered for general well-being inclusion, for instance, by covering treatment for mental, neurological, and drug use issues in medical care benefit bundles and protection frameworks. Enhancing human resource ability to provide mental health and social care and executing local area based administrations that advance individuals' basic freedoms, for example, coordinating people with lived insight in assistance plan, execution, and checking. Guarantee widespread availability of emergency mental health and psychosocial support. In every emergency, mental health and psychosocial care must be provided to the people effectively. Defending and supporting the basic freedom of people with genuine dysfunctional behaviours and psychosocial weaknesses, for instance, by guaranteeing fair admittance to focus on supporting community acts that build social cohesiveness and alleviate loneliness, such as events that link solitary elderly individuals also providing continuous in person care for serious mental health disorders by explicitly classifying such care as essential services that must be maintained during the pandemic and investing in remote delivery of mental health therapies, such as quality assured Tele counselling for frontline health care providers and patients suffering from depression and anxiety [16-17].

**Support recovery from COVID-19 by building mental health services for the future:** To aid society's recovery from COVID-19, all impacted localities will require high quality mental health treatments like creating local area based administrations that defend and advance individuals' common liberties, for example, incorporating people with lived insight into assistance plan, execution, and checking furthermore, leveraging existing interest in mental health to spark mental health changes [18].

**COVID-19 and the depressive mental states:** Mental health is an essential part of mental well-being in which people can cope successfully with life's countless pressures, maximize their potential, work productively and fruitfully, and contribute to their communities. The effects on the commonness and weight of significant burden some problems and tension issues were generous, especially among females and more youthful populaces. Progressing and extra psychological wellness overviews are important to measure the span and seriousness of this effect. Tragically, even before the development of the COVID-19 pandemic, significant burdensome problems and nervousness issues were driving reasons for sickness trouble, with the emotional wellness care framework in many nations being under resourced and muddled in their administration conveyance. Thusly, handling this expanded emotional well-being weight will introduce prompt difficulties in many countries. However, it is likewise a chance for nations to extensively re-evaluate their psychological

well-being and administration reaction [19]. Dependency and tension altogether surpassed populace standards. Being more youthful and most in danger of COVID-19 were related to more prominent gloom, nervousness, and stress. More noteworthy positive mind set, lower depression, and more prominent exercise were defensive elements for all results. Smoking and liquor utilization were related to expanded tension. Pet possession was related to lower melancholy and nervousness. While adapting to age and sexual orientation contrasts, nervousness and stress were altogether lower in NZ than in the UK. The NZ test revealed lower apparent danger and stress over COVID-19 than the UK test. We assessed a considerable expansion in the pervasiveness and weight of significant burdensome issues and tension issues because of the COVID-19 pandemic. Extensions in the inescapability of huge troublesome issues and apprehension issues during 2020 were both related to extending SARS-CoV-2 pollution rates and lessening human movability. These two COVID-19 impact markers intertwined the joined effects of the spread of the contaminations, lockdowns, stay at home demands, reduced public vehicle, school and business terminations, and lessened social participation, among various factors. We surveyed that countries hit hardest by the pandemic during 2020 had the best extensions in the inescapability of these issuances [20].

Before COVID-19 arose, insights on emotional wellness conditions (counting neurological and substance use problems, self-destruction hazards, and related psychosocial and scholarly handicaps) were at that point distinct. Uneasiness and depression cost the economy more than \$1 trillion yearly [21]. More than 264 million people across the world are affected by depression. Half of all psychological well-being conditions start before the age of 14, and self-destruction is the second biggest reason for grimness and mortality among youngsters matured 15-29. More than one in every five people living in impacted networks is determined to have a psychological or mental problem. People experiencing persistent mental issues bite the dust 10-20 years sooner than the typical dissemination. Fewer than half of countries guarantee that their emotional well-being arrangements are by common liberties arrangements [5-9]. Despite proof that successful treatments can be managed in any asset circumstance, somewhere in the range of 76 and 85% of people with emotional well-being issues don't acquire treatment in low and centre pay countries. There is less than one psychological well-being specialist for every 10,000 people around the world. Human privileges breaking against people with genuine dysfunctional behaviours are normal in all countries across the world neurology [17-21].

**Effects of COVID-19:** COVID-19 can induce neurological symptoms such as fatigue, impairment of smell, taste, agitation, disorientation, stroke, and meningoencephalitis. Underlying neurological problems increase the chance of COVID-19 hospitalization, particularly in older patients. Stress, social isolation, and familial violence are all likely to have an impact on young



children's and teens' brain health and development. Social isolation, a lack of physical activity, and a lack of intellectual stimulation all increase the risk of cognitive decline and dementia in the elderly [22-27].

**Prevention of mental illnesses due to COVID-19:** Right after the effect of the COVID-19 pandemic on the pervasiveness and weight of significant burdensome issues and tension issues, making no move can't be a choice. Assets exist to direct the advancement of moderation procedures for lessening the psychological well-being trouble forced by COVID-19. These assets incorporate procedures that utilize currently restricted assets, think about the neighbourhood setting and weak populaces, and focus on key standards like inclusivity, shame decrease, and basic liberties. Methodologies ought to advance mental prosperity and target determinants of poor psychological wellness exacerbated by the pandemic and mediations to treat the people who foster a psychological issue [27-32].

**The impact of COVID-19 on the mental health of children:** This pandemic isn't on a basic level affecting children. In any case, they are at risk of becoming one of its most outrageous setbacks. While they have been saved from the quick prosperity consequences of COVID-19 for the present, the crisis is through influencing their flourishing [33]. Taking everything into account, all young people from all nations are affected, particularly by monetary results and, in specific conditions, control attempts that may incidentally cause more harm than extraordinary. This is an overall issue with long stretch implications for explicit young people. Moreover, the risky effects of this pandemic will not be passed on in much the same way. They are dependent upon large hurting for adolescents in all lucky countries. In the most lamentable regions, and for those in as of now hindered or feeble conditions [34-35].

### CONCLUSION

In outline, normal psychological well-being issues are related to a scope of side effects that can prompt critical debilitation and handicap. The significant expenses are both for the person with the problem and society overall. Successful medicines are accessible that vary contingent upon the problem.

Accordingly, early location, evaluation, and intercession are key needs for any medical services framework. This rule, which is centred on essential consideration, will give suggestions on the most proficient method to best distinguish and survey normal psychological well-being problems and the critical pointers for treatment to help improve and work with admittance to mind, and the course through care.

The COVID-19 pandemic has played a huge role on the mental health of all age groups from children to the geriatric population. In the article we have covered the psychological problems related to COVID-19 and what are some possible actions that could be taken to minimize the consequences of the pandemic individual and communal health, as well as emotional and social

functioning, are all threatened by the COVID-19 pandemic. In addition to providing medical care, already overburdened health care practitioners must monitor psychosocial needs and provide psychosocial support to their patients, health care providers, and the general public actions that should be incorporated into general pandemic health care.

Adventures with helpers who are similarly at the extended hazard of straight forwardness and contamination could become classed as high risk structures. As shown by the affirmation dispersed, the significant purposes for Coronavirus misleading are social effects, never ending drive demands during mix astonishing quality, inconvenience free spread of fake news through web based media, cash related pushing powers, and nonappearance of oversight. Publicizing and financial benefits also set off precariousness dispersed, as tracked down in various evaluations. The COVID-19 pandemic is linked to extremely high levels of psychological anguish, which, in many cases, would fulfil the clinical relevance criteria. Mitigating COVID-19's dangerous effects on mental health is a global public health issue.

### REFERENCES

1. Kamel B. Geographical tracking and mapping of coronavirus disease COVID-19/Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) epidemics and associated events around the world: how 21<sup>st</sup> century GIS technologies are supporting the global fight against outbreaks and epidemics. *Int J Health Geogr* 2020; 19:1-8.
2. World Health Organization. WHO Coronavirus (COVID-19) Dashboard. 2022.
3. Benhamou D, Keita H. Coagulation changes and thromboembolic risk in COVID-19 obstetric patients. *Anaesth Crit Care Pain Med* 2020; 39:351-353.
4. Iba T, Levy JH, Levi M. Coagulopathy of Coronavirus disease 2019. *Crit Care Med* 2020; 48:1358-1364.
5. Di Renzo GC, Giardina I. Coronavirus disease 2019 in pregnancy: Consider thromboembolic disorders and thromboprophylaxis. *Am J Obstet Gynecol* 2020; 223:135.
6. Dushyant B, Pratik P, Ayurva G. COVID-19 facets: pandemics, curse and humanity. *Int J Res Pharm Sci* 2020; 6:385-390.
7. Connors JM, Levy JH. COVID-19 and its implications for thrombosis and anticoagulation. *Blood* 2020; 4:2033-2040.
8. Bikdeli B, Madhavan MV, Jimenez D. COVID-19 and thrombotic or thromboembolic disease: implications for prevention, antithrombotic therapy, and follow up: JACC State of the art review. *J Am Coll Cardiol* 2020; 16:2950-2973.
9. Di Minno A, Ambrosino P, Calcaterra I. COVID-19 and venous thromboembolism: A meta-analysis of

- literature studies. *Semin Thromb Hemost* 2020; 46:763-771.
10. Gasteiger N, Vedhara K, Massey A. Depression, anxiety and stress during the COVID-19 pandemic: results from a new Zealand cohort study on mental well-being. *BMJ Open* 2021; 1:16.
  11. Abrenica J. Effects of social media on academic performance of high school students under pandemic (COVID-19) situations. *Soc Sci Res Network* 2021; 10:21-39.
  12. Smart Net COVID-19: The end of global sustainable cities? Malaysia, 2020.
  13. Aarogya Setu. How AarogyaSetu know about your COVID-19 positive status? 2022.
  14. World Health Organization (WHO). World Patient Safety Day. 2022.
  15. World Health Organization (WHO). Coronavirus disease (COVID-19).
  16. World Health Organization (WHO). Coronavirus disease (COVID-19) pandemic. 2020.
  17. Deepika G. Impact of COVID-19 on maternal mental health. *Am J Matern Child Nurs* 2021; 46:103-109.
  18. ITU-D Capacity Development. Develop skills and knowledge to become a competent digital citizen. 2021.
  19. Ines M. WhatsAppitis. *Lancet* 2014; 383:1040.
  20. Linden SVD, Roozenbeek J, Compton J. Inoculating against fake news about COVID-19. *Front Psychol* 2020; 11:566790.
  21. Basuroy T. Statistics. Internet usage in India statistics and facts. 2022.
  22. Arnold S. The Future of SARS-CoV-2 Vaccination lessons from Influenza. *N Eng J Med* 2021; 385:1825-1827.
  23. Pandey S, Poudel S, Gaire A, et al. Knowledge, attitude and reported practice regarding donning and doffing of personal protective equipment among frontline healthcare workers against COVID-19 in Nepal: A cross-sectional study. *PLOS Glob Public Health*. 2021, 12:1.
  24. Organisation mondiale de la Santé. Dépistage en laboratoire des cas suspects d'infection humaine par le nouveau coronavirus 2019 (2019-nCoV): lignes directrices provisoires, 17 janvier 2020. World Health Organization. 2020;1-8.
  25. Bielicki JA, Duval X, Gobat N, et al. Monitoring approaches for health care workers during the COVID-19 pandemic. *Lancet Infect Dis* 2020; 20:261-270.
  26. Personal Protective Equipment (PPE) and infection among healthcare workers what is the evidence? *Int J Clin Pract* 2020; 74:e13617.
  27. Park SH. Personal protective equipment for healthcare workers during the COVID-19 pandemic. *Infect Chemother* 2020; 52:165-182.
  28. Tan LF. Preventing the transmission of COVID-19 amongst healthcare workers. *J Hosp Infect* 2020; 105:364-365.
  29. Zhang Z, Liu S, Xiang M, et al. Protecting healthcare personnel from 2019-nCoV infection risks: lessons and suggestions. *Front Med* 2020; 14:229-231.
  30. World Health Organization (WHO). Rational use of personal protective equipment for coronavirus disease (COVID-19): interim guidance. 2020.
  31. Amerisource Bergen. Sequence for donning and doffing Personal Protective Equipment (PPE). 2022.
  32. Liu M, Yang Y, Zhang H. Use of personal protective equipment against Coronavirus disease 2019 by healthcare professionals in Wuhan, China: cross sectional study. *BMJ* 2020; 10:2195.
  33. Food and Drug Administration (FDA). Medical Gloves. U.S. 2020.
  34. Food and Drug Administration (FDA). Health C for D and R. 2021
  35. Dias D. Living with uncertainty in times of pandemic: The view of working students in higher education. *Intech Open* 2021; 1:1-8.