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Impact of Coronavirus Pandemic on Immunocompromised Patients: A Detailed Review

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ABSTRACT

Background: The coronavirus (COVID-19) pandemic has been stressful for everyone across the globe and even more so for the immunocompromised population, bringing with it an enormous emotional impact on their lives. Fear and anxiety regarding this novel disease created a state of panic among the public. The aim was to review published cases of COVID-19 and to discuss pandemic related anxiety and stress in immunocompromised populations and describe their presentations, diagnostic processes, clinical characteristics and outcomes.

Methods: Using specific keywords, a review of scientific literature was conducted in databases such as PubMed, Google Scholar including systematic reviews, meta-analysis, case series, and case reports. Of 35 articles, 22 studies were reviewed.

Results: Of the 22 studies involved, a few of the studies had significant data. Among 603 ovarian cancer patients, 88.6% were worried, 51.4% anxious, and 26.5% depressed due to COVID-19 related delay in care. Among 167 people living with HIV patients, 25% reported generalized anxiety disorder. In another cross-sectional study with 500 respondents, anxiety (aOR = 1.73; 95% CI, 1.25–2.40, p-value = 0.001), depression and anxiety (aOR = 1.80; 95% CI, 1.28–2.53, p-value <0.001), and mental health deterioration (aOR = 1.94; 95% CI, 1.48–2.55, p-value <0.001) on basis of fear of the COVID pandemic was noted.

Conclusion: As a conclusion, these articles demonstrated that patients with immunocompromised states had more symptoms of anxiety and fear as compared to the immunocompetent patients. Most of the patients had concerns of fear about future health implications, concern over social implications, and possible financial difficulties encountered and remained infectious for a longer duration with severe anxiety symptoms.

Keywords: COVID-19, Immunocompromised, HIV

1 Introduction

Though most of the patients with COVID-19 recovered, its high rate of contagion has caused a factor of anxiety in the public. Anxiety disorders ranging from panic attack, phobias, acute

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stress disorder, PTSD, OCD, generalized anxiety disorder, anxiety disorder due to general medical condition, substance induced anxiety, and anxiety not otherwise specified have been reported in higher numbers since the beginning of the COVID-19 pandemic. Though social distancing helped a lot to reduce the spread of viruses, it also contributed to the deterioration of mental health.

The Centers for Disease Control and Prevention (CDC) states that having an immunocompromised state can make you more likely than others to be severely ill from COVID-19. The term "Immunocompromised" is referred to as a state with weak immune response to any physiological stress/infection. Just like the general population, immunocompromised and chronic disease patients have also been facing immense emotional and physical stress during this pandemic.

This study aims to review the effects of anxiety on the immunocompromised due to the COVID pandemic**.**

2 Methods

Search method and strategy

We conducted a literature review about Covid-19 and immunocompromised patients with anxiety in databases such as PubMed, Google Scholar, and Science Direct, JAMA. We used specific keywords; "COVID-19," "anxiety," "SARS-COV-2," "Pandemic." We chose to focus on systematic reviews, meta-analyses, case series, and case reports. In doing so, we had 22 articles for the final review. Our review included studies from various countries across the globe. Referencing was done according to guidelines using Endnote.

Ethical approval and funding

This study did not require ethical approval as data was obtained from already available databases, and patients were not directly involved. No funding was obtained for this review.

Table 1

Study Name	Year of Study	Place of Study	Summary
Hsu et al	2020	China	Describes the experience providing nursing care to a patient who was diagnosed with COVID-19. The problems faced by the patient included (1) existing infections related to COVID-19 and (2) anxiety related to uncertainties about disease prognosis.
Frey at al	2020	United States	Younger age, presumed immunocompromise, and delay in cancer care were associated with significantly higher levels of cancer worry, anxiety, and depression.
Campos et al	2020	Spain	50% of patients reported being worried about their predisposition to a severe SARS-COV-2 infection and 29% of them took anxiolytics or antidepressants for this.
Tunçel e al	2020	Turkish	One-fourth of the participants had anxiety. Having a preexisting psychiatric disorder, perceiving that they were practicing insufficient preventive measures, not being sure about the presence of any individuals with COVID-19 in their environment, and living with a household member with a chronic disease were found to be the risk factors of people with HIV for having anxiety during this pandemic.
Marbaniang et al	2020	India	In a group of socioeconomically disadvantaged PLHIV, a fourth were found to have anxiety that appeared to be influenced by concerns about ART availability and the persistence of anxiety increase is anticipated as the pandemic worsens in India.

Fodjo et al	2020	Belgium and Brazil	Seventy-four (23.3%) respondents screened positive for major depressive disorders, whereas 72 (22.7%) had generalized anxiety disorders.
Ganson et al	2020	United States	Results revealed significantly higher adjusted relative risk ratios of medical care avoidance among US adults who experience common symptoms of anxiety and depression.
Stephenson et al	2020	United States	Participants perceived greater seriousness for HIV infection (mean 46.67, range 17-65) than for COVID-19 infection (mean 38.81, range 13-62). Some items reflecting more proximal impacts of infection (anxiety, loss of sleep, and impact on employment) were similar for HIV and COVID-19.
Sagaon-Teyssier et al	2020	Mali	Symptoms of depression, anxiety and insomnia were declared by 71.9, 73.3, and 77% participants, respectively. Women were at greater risk of MHD. A lack of personal protection equipment and human resources, especially nurses, was associated with a high risk of MHD.
Mi et al	2021	China	The prevalence of depression and anxiety in the current study was 13.31% and 6.61%, respectively. Results from path analyses revealed that the main effects of COVID-19-related stressors and coping were significant on both depression and anxiety. The interaction of coping and COVID-19-related stressors had significant effects on depression and anxiety. Simple slope tests revealed that more coping behaviors buffered against the negative effect of COVID-19-related stressors on mental health problems.
Ballivian et al	2020	Argentina	Results highlight PLWH's capacity to adhere to treatment in challenging circumstances and the importance of developing resilience skills for better coping with stress and adversity.
Pizzirusso et al	2021	United States	Mental health symptoms were endorsed in 45% with PHQ-2 and 43% with GAD-2, although the threshold for major depression was met in only 4% and for GAD in 14%. Higher PHQ scores were associated with respiratory symptoms, but not prior mood or anxiety disorders. GAD-2 scores were higher with past mood disorders, but not with prior anxiety disorders or respiratory symptoms.
Cooley et al	2021	United States	PLWH were more likely to have restricted access to medical care, increased financial stress, increased symptoms of anxiety and depression, and increased substance use compared to demographically similar people without HIV.
Hyndman	2021	United Kingdom	COVID-19 restrictions had a considerable impact on sexual behaviour and mental well-being in respondents. Changes to SHS provision for MSM must respond to high rates of psychological and STI-related morbidity and the challenges faced by this population in accessing services.
Donne et al	2021	Italy	Out of 98 participants, 45% revealed mild to severe psychological impact from COVID-19 according to IES-R. A lower percentage, instead, complained of significant levels of depression (14%), anxiety (11%) or stress (6%) according to DASS-21. Almost half of our PLWH sample experienced significant levels of distress related to the COVID-19 pandemic. Women, elderly patients and those with recent HIV diagnosis appear to be the more psychologically fragile subgroups.
Okumu et al	2021	**Sub-Saharan Africa**	COVID-19 social control measures can have immediate effects on individuals' mental health. This may be particularly true of adolescents living with HIV (ALHIV) and their caregivers - populations already overburdened by intersecting stressors.
Al-Rahimi et al	2021	**Saudi Arabia**	It was found that 21.44% of participants met the criteria for anxiety cases, and 19.4% considered borderline anxiety cases. In regression analysis, significant predictors of fear and health anxiety were female gender, lower education, middle-aged, divorced or widowed, receiving immunosuppressants, type of chronic disease, and media use as a source of knowledge about COVID-19. Immunocompromised and chronic disease patients are vulnerable to fear and anxiety during epidemic infectious diseases such as COVID-19.

Fodjo et al	2021	Brazil and Belgium	Of the 247 responses analyzed (mean age: 44.5 ± 13.2 years; 73.7% male), 67 (27.1%) and 69 (27.9%) respondents screened positive for anxiety (GAD-2 score ≥ 3) and depression (PHQ-2 score ≥ 3), respectively.
Diaz et al	2021	Peru	Explored the knowledge of COVID-19 and the socioeconomic and health impact of the pandemic among middle-aged and older PWH. Increased anxiety was reported in 64% and stress in 77%.
Martinez et al	2021	Miami	Compared to HIV-uninfected participants (n = 80), those living with HIV (n = 116) reported fewer anxiety symptoms, less COVID-19-related worry, and higher resilience. Those with more anxiety symptoms and lower resilience engaged in more frequent alcohol consumption, binge drinking, and cocaine use. Alcohol misuse was more common among HIV-uninfected participants.
Wion & Miller	2021	United States	Participants reported increases in social isolation, depressive symptoms, anxiety, and stress and decreases in social support and overall HIV self-management from pre- to during the pandemic.
Garcia et al	2021	México	The overall prevalence of significant DS was 53.3%. By LCA posterior probabilities we identified three classes: (1) minimal impact of COVID-19 (54.1%), (2) objective risk for COVID-19 (41.5%), and (3) anxiety and economic stress caused by COVID-19 (4.4%). Multivariate logistic regression showed that compared with those in class one, the odds of having significant DS were almost five times higher for those in class three.

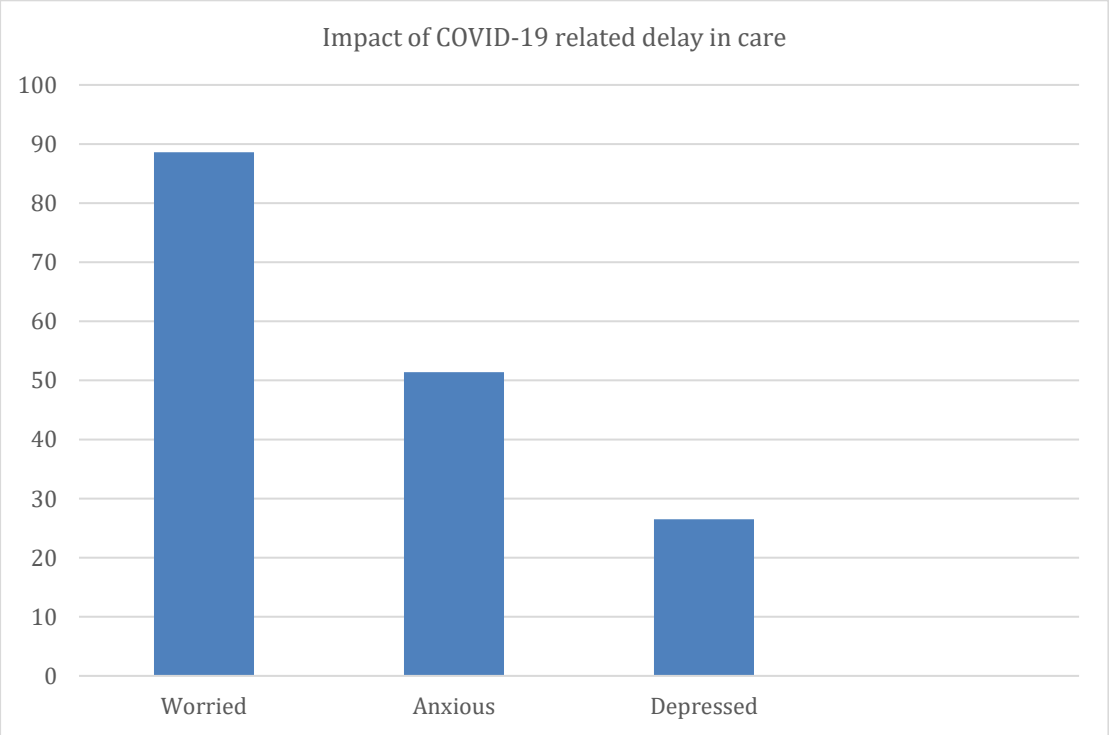

Fig. 1: *Understanding the influence of COVID-19 related delay in care.*

3 Discussion

With the advance of the pandemic, it's been noted that COVID-19 generates more than just physical repercussions in patients. Immunocompromised patients are even more susceptible to covid-related aggravations and affections. They may, therefore, also be more susceptible to the psychological repercussions generated by the disease and develop more significant concern due to the greater possibility of its severity. Thus, the objective of this study was to analyze the psychological repercussions linked to the disease of immunocompromised patients.

The studies analyzed represent a portion of the population in different regions and countries and corroborate the general view that patients with greater possibilities of a severe presentation of COVID-19 infection are more likely to be suffering from psychological symptoms and disorders, such as anxiety. Conditions such as cancer, HIV, and Gaucher disease are included in the studies as risk factors for such repercussions.

The authors use quantitative and qualitative studies to assess factors associated with stress, anxiety, and depression. In a study by Hsu et al. (2020), nursing care experience for patients diagnosed with covid was addressed. Using assessments for the social and the psychological dimensions, they reported that such patients had a high level of anxiety related to uncertainties regarding the diagnosis of COVID; and a therapeutic interpersonal relationship model was proposed to alleviate anxiety issues. (1) Campos et al. (2020) also analyze the impact of the SARS-CoV-2 pandemic in a Spanish community carrying Gaucher disease (GD), where greater vulnerability to COVID is a factor linked to greater anxiety in these individuals. 50% of patients reported being concerned about their predisposition to severe SARS-COV-2 infection and 29% of them were taking anxiolytics or antidepressants for this. (2)

Tunçel et al. (2020) also point to the emergence of the coronavirus disease outbreak and its emotional impact on some vulnerable groups, such as people living with the human immunodeficiency virus (HIV). By looking at anxiety levels and their sources, they found out that a quarter of this group had anxiety symptoms. As associated factors, already having a pre-existing psychiatric disorder, the practice of insufficient preventive measures, and the uncertainty of the presence of an individual with COVID-19 in their environment and living with a family member with a chronic disease, were all risk factors cited for developing anxiety in these individuals during the pandemic. (3)

Other authors also obtained results that corroborate the variables of anxiety and immunocompromised patients. Pizzirusso et al. (2021), in a structured interview, evaluated physical symptoms associated with COVID-19, and mental health screenings were carried out with the Generalized Anxiety Disorder (GAD-2) as well as the the Patient Health Questionnaire (PHQ-2). Mental health symptoms were endorsed by 45% with PHQ-2 and 43% with GAD-2, although the threshold for major depression was reached in only 4% and GAD in 14%. Higher PHQ scores were associated with respiratory symptoms but not with prior mood or anxiety disorders, whereas GAD-2 scores were higher in patients with prior mood disorders but not with prior anxiety disorders or respiratory symptoms. (4)

Donne et al. (2021) explored the psychological impact of the early-stage coronavirus pandemic (COVID-19) on people living with HIV (PLHA), a population at increased risk of psychological distress. Of the 98 participants, 45% revealed a mild to severe psychological impact in relation to COVID-19 according to IES-R. A smaller percentage, on the contrary, complained of significant levels of depression (14%), anxiety (11%), or stress (6%), according to DASS-21. Almost half of the PLWHA sample experienced significant levels of suffering related to the COVID-19 pandemic. Women, elderly patients, and those newly diagnosed with HIV appear to be the most psychologically fragile subgroups. (5) Fodjo et al. (2021) also obtained significant results for anxiety (27.1% of the sample) and depression (27.9% of the sample). (6)

Not only the concern with the diagnosis itself generates an anxious response from patients, but Immunocompromised patients also have anxiety about their previous conditions and an

incomplete monitoring of these conditions due to hospital and care restrictions during a pandemic period. Frey et al. (2020) demonstrate in their studies the association of significantly higher levels of concern about cancer, anxiety, and depression in ovarian cancer patients with the postponement or cancellation of surgeries, treatments, scheduled medical appointments, laboratory tests, and exams of image. (7)

Marbaniang et al. (2020) point to gaps in the literature regarding data on anxiety related to the COVID-19 pandemic in people living with HIV (PLHIV). The author brings to light the discussion of the association between anxiety factors and non-adherence to antiretroviral therapy (ART). In this study, a relationship between anxiety and the availability of antiretroviral therapy was established in a group of PLHIV at a socioeconomic disadvantage. Furthermore, the persistence of sources of anxiety and, therefore, an increase in anxiety for these PLHIV is anticipated as the pandemic worsens in India, where the study was conducted. (8)

Fodjo et al. (2020) also analysed patiens with HIV, their psychosocial well-being, COVID-19 symptoms, as well as prevention measures. COVID-19 and associated restrictive measures appear detrimental to the well-being and monitoring of PLWHA. Seventy-four (23.3%) respondents screened positively for major depressive disorders, while 72 (22.7%) had generalized anxiety disorders. (9) Ganson et al. (2020) showed in their results that mental health symptoms are strongly correlated with avoidance of medical care amid the COVID-19 pandemic. This study of US adults with signs of depression and anxiety revealed significantly higher adjusted relative risk rates of avoiding medical care. (10) Thus, it is demonstrated that anxieties related to the onset of the disease are relevant and anxiety related to the possibility of continuity of treatment and restrictions caused by COVID-19. Other studies that corroborate the relationship of anxiogenic repercussions and restriction of medical care by these populations are those by Cooley et al. (2021), who points out that people living with HIV (PLHA) may be at greater risk of adverse outcomes indirectly associated with the syndrome severe acute respiratory coronavirus (SARS-CoV-2). Being more likely to have restricted access to medical care, increased financial stress, increased symptoms of anxiety and depression, and increased substance use compared to demographically similar people without HIV. (11)

Furthermore, Hyndman (2021) reported that COVID-19 restrictions had a considerable impact on the sexual behavior and mental well-being of research participants. In addition, respondents demonstrated reduced access to health services related to the treatment and identification of HIV. Therefore, changes in the provision of sexual healthcare services (SHS) for men who engage in sexual activities with other men must respond to the high rates of psychological and STD-related morbidity and the challenges this population faces in accessing health services. (12)

Immunocompromised patients, especially those affected by HIV, are often already at-risk groups to develop psychological and psychiatric disorders. In addition, some factors such as sexuality (gays, lesbians, and trans-sexuals), immunocompromised individuals and more susceptible to contamination by infectious and viral diseases, and already physically and psychologically burdened by chronic conditions, are more easily affected by anxiety issues during the pandemic.

Some studies that demonstrate such associations are brought by authors such as Garcia et al. (2021), who assessed the prevalence of depressive symptoms and explored the association with characteristics related to the COVID-19 pandemic. The study of gay men and transgender women demonstrated high levels of depression and anxiety among these groups in Mexico during the COVID-19 pandemic. (13) Another study exemplifies the relationship between vulnerability and anxiety brought by Diaz et al. (2021). They explored the knowledge of COVID-19 and the socioeconomic and health impact of the pandemic among middle-aged and elderly PWH, where anxiety increases. It was reported in 64% and stress in 77% of this population. (14)

Al-Rahimi et al. (2021) demonstrated how immunocompromised patients with chronic diseases are vulnerable to fear and anxiety during epidemic infectious diseases such as COVID-19 in a study that assessed the levels of fear and anxiety about health and investigated its predictors during the current outbreak of COVID-19 in immunocompromised and chronically ill patients in Saudi Arabia. A significant number of patients with chronic illnesses experienced multiple levels of fear and anxiety during the COVID-19 outbreak. It was found that 21.44% of the participants met the criteria for anxiety cases, and 19.4% considered borderline anxiety cases. (15)

Okumu et al. (2021) report how COVID-19 social control measures (physical distancing and blocks) can have immediate effects (social isolation, loneliness, anxiety, stress) and long-term effects (depression, post-traumatic stress disorder) on the mental health of individuals. It can be intensified in adolescents living with HIV (ALHIV) and their caregivers since they are populations already burdened by stressors that intersect in the pandemic context. (16) Hyndman (2021) reported that COVID-19 restrictions had a considerable impact on the sexual behavior and mental well-being of survey participants. High rates of sexual activity and STD diagnoses have been reported during confinement. High rates of anxiety, isolation, and loneliness were revealed as reasons that lead to sexual contact in violation of restrictions. Changes in the provision of sexual healthcare services (SHS) for men who engage in sexual activities with other men must respond to the high rates of psychological and STD-related morbidity and the challenges this population faces in accessing health services. (17)

Other studies point to the impact of anxiety on professionals who deal with such conditions. Sagaon-Teyssier et al. (2020) aimed to identify the individual and structural factors associated with mental disorders (DMH) in NGO health workers involved in the care of HIV patients in the initial phase of the pandemic. Assessed using the PHQ-9, GAD-7, and ISI instruments for depression, anxiety, and insomnia, it was found that symptoms of depression, anxiety, and insomnia were reported by 71.9, 73.3%, and 77% of the participants, respectively. Where women were at higher risk for MHD. Lack of personal protective equipment and human resources, especially nurses, was associated with a high risk of DMH. Such issues can directly impact the provision of care for the HIV-positive population, as they also depend on the health professional's ability to fully and competently perform their functions. (18) Mi et al. (2021) found the prevalence of depression and anxiety at 13.31% and 6.61%, respectively, in HIV healthcare providers concerning the COVID-19 pandemic. (19)

In contrast to these papers, Stephenson et al. (2020) study the relationship of increased anxiety about COVID-19. Their studies demonstrated that participants perceived a greater clinical severity of HIV infection (mean 46.67, range 17-65) than COVID-19 infection (mean 38.81,

range 13-62). Using two scales, ie. the perceived severity of the HIV infection and the severity perceived infection by COVID-19, some items that reflect more immediate impacts of the infection (anxiety, sleep loss, and impact on employment) were shown to be similar for HIV and COVID-19. (20)

Overall, studies bring the negative impact on psychological symptoms experienced as a result of the covid-19 pandemic. From a perspective of resilience and strategies to deal with adversities and repercussions in this context, some authors point to capacities to overcome and create skills and means to re-signify their experiences in this period and ways to deal with their pre-existing conditions. Ballivian et al. (2020) assessed the impact of COVID-19 on economic disruption, resilience, and mental health outcomes (depression, anxiety, stress, and loneliness), where respondent participants assessed the impact of COVID stress and emotional stress block were satisfactorily diminished through resilience coping strategies. (21) Martinez et al. (2021) assessed mental health and substance use during the COVID-19 pandemic. Compared with non-HIV-infected participants, those living with HIV reported fewer anxiety symptoms, less concern related to COVID-19, and greater resilience. Those with more anxiety symptoms and less resilience engaged in more frequent alcohol consumption, binge drinking, and cocaine use. (22)

The results highlight the ability of these individuals to adhere to treatment in challenging circumstances and the importance of developing resilience skills to better deal with stress and adversity. In contrast, Wion & Miller (2021) examined the impact of the COVID-19 pandemic on HIV self-management, social support, social isolation, depressive symptoms, anxiety, and stress in PLHIV. Participants reported increases in social isolation, depressive symptoms, anxiety and stress, and decreases in social support and overall HIV self-management from the pre to pandemic period. (23)

4 Declarations

4.1 Competing Interests

All Authors declare no conflict of interest.

4.2 Publisher's Note

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