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ORIGINAL ARTICLE

Prevalence of COVID-19 and Following Personal Protective Protocols among Liver Transplant Candidates and Recipients and their Family Members

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Abstract

Introduction: Person-to-person transmission of COVID-19 disease is reported to be the main route of transmission among the population putting organ transplant candidates and recipients at a high risk of morbidity and mortality. The present study aimed to assess the frequency of following COVID-19 personal protective protocols among liver transplant candidates and recipients.

Methods: In this cross-sectional study, 170 liver transplant candidates and recipients, as well as their family members (n=348), at Guilan transplant center in Rasht, Iran, were selected via convenience sampling method. The participants' clinical and demographical data, as well as history of COVID-19 infection and adherence to personal protective protocols (mask usage, glove usage, and social and physical distancing), were recorded. Data analysis was performed using SPSS software (version 22).

Results: Out of 170 participants, 84 (49.4%) cases were liver transplant candidates, and 86 (51.6%) subjects were liver transplant recipients. The mean age of liver transplant candidates was 50.24±12.83 years, while the mean age of liver transplant recipients was 42.97±16.56 years. The frequency of COVID-19 infection among liver transplant candidates, liver transplant recipients, family members of liver transplant candidates, and family members of liver transplant recipients were 3(3.6%), 5(5.8%), 4(2.4%), and 2(1.1%), respectively. Patients and their family members' adherence to personal protective protocols was above 90%.

Conclusion: The obtained results pointed to the low frequency of SARS-CoV-2 infection among liver transplant candidates and recipients. The findings highlighted the considerable impact of following personal protective protocols on the prevention of COVID-19.

Keywords: COVID-19, Liver transplantation, Protective factors, SARS-CoV-2

Introduction

The COVID-19 pandemic has profoundly impacted liver transplantation, affecting various stages of transplant process, including pretransplant, perioperative, and post-transplant periods. Despite ongoing research, our understanding of the severe acute respiratory syndrome coronavirus 2 (SARS-

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CoV-2) responsible for the pandemic is still evolving (1-3). COVID-19 manifests with a wide array of clinical symptoms, ranging from mild to severe, and individuals with comorbidities, such as chronic liver disease, face a higher risk of morbidity and mortality (4-6). Diagnostic features for COVID-19 include positive polymerase chain reaction (PCR) test results and computed tomography (CT) scan findings, alongside other laboratory and clinical findings (3,7).

A meta-analysis study conducted in the USA and China, involving over 900,000 participants, revealed that COVID-19 patients with chronic liver disease had higher morbidity and mortality rates than those without liver disease (8). Numbers of solid organ transplant recipients among COVID-19-negative convalescing candidates confirmed graft safety within days or weeks after COVID-19 infection (9-11). Implementation of health protocols, including social and physical distancing, hand hygiene, and personal protective equipment, is strongly recommended for patients with transplant recipients to reduce the risk of SARS-CoV-2 infection (12,13). Therefore, it is essential to consider safe and effective protocols to protect healthcare staff during transplantation. It was reported that using masks, sanitizers, and hand hygiene compliance significantly decreased the frequency of COVID-19 transmission among healthcare workers (14). For the safety of healthcare workers and patients, hospitals should consider personal protective protocols and equipment for liver transplants and labor-intensive surgical procedures (15).

Given the dramatic impact of the pandemic on living donor liver transplants and the need to ensure graft safety, it is crucial to implement effective protocols to protect liver transplant candidates and recipients from infectious diseases, such as COVID-19. In light of the aforementioned issues, the present study aimed to assess the prevalence of adherence to personal health protocols among liver transplant candidates and recipients and their families during the COVID-19 pandemic. By focusing specifically on liver transplant candidates and recipients, our study uniquely contributes to understanding personal protective protocol adherence in this vulnerable population.

Methods

This cross-sectional study was conducted on 170 liver transplant candidates and recipients along with their immediate family members living in the same household who were registered at Guilan Transplant Center, Guilan University of Medical Sciences, Rasht, Iran, in 2020. The participants were selected via convenince sampling method. The Ethics Committee of Guilan University of Medical Sciences (IR.GUMS.REC.1399.520) approved the study design and procedures. Prior to data collection, informed consent was obtained from all participants, ensuring their voluntary participation and confidentiality. Data on age, gender, and number of family members were recorded. A history of COVID-19 infection which was confirmed by positive results of PCR tests and CT scans for SARS-CoV-2 infection and adherence to personal preventive protocols was recorded for all participants. Data were reported as numbers, percentages, and mean±standard deviation (SD). The statistical analysis was performed using SPSS software (version 22).

Results

As evidenced by the obtained results, out of 170 patients, 84 (49.4%) cases were liver transplant candidates, and 86 (51.6%) subjects were liver transplant recipients. The mean age of liver transplant recipients was 50.24±12.83 years (18-73 years old) and 59 of them were male (68.6%), and the mean age of the liver transplant candidates was 42.97±16.56 years (1-72 years old) and 48 of them were male (57.1%). Out of 348 people from the first-degree family and the same household of the patients, 166 (47.7%) cases were from the first-degree family and the same household of patients for liver transplant candidates with a mean age of 38.02±18.37 years (4-82 years old) and the majority of females (50.6%). About 182 (52.3%) subjects were the first-degree family and the same household as liver transplant recipients, with a mean age of 38.17±18.19 years (4-78 years old) and the majority of females (53.3%).

Among liver transplant candidates, about 3.6% of cases and their family members, about 2.4% had COVID-19. Among liver transplant recipients, about 5.8% and their family members, about 1.1% were infected with SARS-CoV-2, and all the patients recovered from COVID-19 disease. The frequency of using a mask, gloves, and social and physical distancing among liver transplant candidates were 94%, 91.7%, and 96.4%, respectively, and among their families, these rates were reported as 97%, 93.4%, and 98.2%, respectively. The frequency of using a mask, gloves, and social and physical distancing among liver transplant recipients were 97.7%, 100%, and 100%, respectively, and among their families, these rates were 97.8%, 97.8%, and 98.9%, respectively. (Table 1)

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Table 1: Frequency of following personal preventive protocols among liver transplant candidates and recipients, as well as their family members

Variables		Liver transplant recipients, n (%)	Liver transplant candidates, n (%)
COVID-19 infection among patients	Yes	5 (5.8)	3 (3.6)
	No	81 (64.2)	81 (96.4)
COVID-19 infection among family members of the patients	Yes	2 (1.1)	4 (2.4)
	No	180 (98.9)	162 (97.6)
Use of masks among patients	Yes	84 (97.7)	70 (94.0)
	No	2 (2.3)	14 (9.0)
Use of masks among family members of the patients	Yes	178 (97.8)	161 (97.0)
	No	4 (2.2)	5 (3.0)
Use of gloves among patients	Yes	86 (100)	77 (91.7)
	No	0 (0.0)	7 (8.3)
Use of gloves among family members of the patients	Yes	178 (97.8)	155 (93.4)
	No	4 (2.2)	11 (6.6)
Social and physical distancing among patients	Yes	86 (100)	81 (96.4)
	No	0 (0.0)	3 (3.6)
Social and physical distancing among family members of the patients	Yes	180 (98.9)	163 (98.2)
	No	2 (1.1)	3 (1.8)

Discussion

The current study investigated the prevalence of COVID-19 and following personal protective protocols among liver transplant candidates and recipients and their family members to evaluate the status of COVID-19 infection among these vulnerable populations. The post-transplant risk of COVID-19 for solid organ recipients due to chronic immunosuppression is concerning, as they are susceptible to ongoing viral infection. Nonetheless, the results of our study demonstrated a low frequency of COVID-19 infection among liver transplant candidates and recipients and their family members, which can be attributed to participants' effective implementation of protective health protocols.

It was revealed that 3.6% of liver transplant candidates and 5.8% of liver transplant recipients had a history of COVID-19 disease, and all of them were recovered. Colmenero et al. reported an increased risk of acquiring COVID-19 in these patients; however, their mortality rates were lower than those observed in the general population (16). It suggested that while chronic immunosuppression increases the susceptibility to SARS-CoV-2 infection, it may also contribute to the reduction of disease severity (4,16). Furthermore, several studies have reported no significant association between chronic liver disease and an increased risk of COVID-19 morbidity and mortality rates (17–19).

On the contrary, a multicenter study by Kim et al. found that patients with COVID-19 and a history of chronic liver disease had a higher mortality rate and greater disease severity (20). In a similar vein, Singh et al. demonstrated that patients with underlying liver disease had a significantly higher risk of hospitalization and mortality than those without liver problems. It could be attributed to the direct impact of COVID-19 on the liver, including its binding to the angiotensin-converting enzyme 2 (ACE2) receptor present in the liver and bile ducts, as well as hypoxia-induced liver damage and organ failure (21). Patients with a history of chronic liver disease and COVID-19 are particularly susceptible to poor outcomes due to the ability of the virus to induce liver damage. Furthermore, the persistent systemic inflammation associated with advanced liver disease can lead to uncontrolled production of inflammatory cytokines and subsequent cytokine storm, further exacerbating the prognosis (22,23).

The results of this study pointed out that all liver transplant candidates and recipients remained immune to the disease despite some infected family members. Our findings illustrated that over 90% of liver transplant candidates, recipients, and their family members reported using masks and gloves and compliance with quarantine and social distancing guidelines, and only 2.4% and 1.1% of family members of liver transplant candidates and recipients reported COVID-19 disease, respectively. As reported by their families, it can be attributed to the diligent use of preventive measures, such as masks, gloves, and compliance with home quarantine. In contrast, previous studies have reported instances of family members transmitting the infection to each other, considering that person-to-person transmission is the main route of disease transmission and families often have close contact with one another (24–26). Consistent with previous research, our study underscored the importance of adherence to prevention protocols among liver transplant candidates, recipients, and their families. Utilizing masks, gloves, regular hand hygiene, adherence to social distancing, and quarantine measures decreased the risk of COVID-19 infection in these populations (27,28).

The strengths of the current study were the

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comprehensive investigation of personal protective protocols and the inclusion of liver transplant candidates, recipients, and their family members. Nevertheless, the study had some limitations, including its cross-sectional nature, limited access to the whole clinical data of participants, and the single-center investigation which limited the generalization of the findings to other populations. Further research involving longitudinal studies and more extensive statistical analyses to explore the effectiveness of personal protective protocols in preventing COVID-19 among liver transplant candidates and recipients and their families has been suggested for future studies.

Conclusions

As illustrated by the results of this study, the overall prevalence of COVID-19 among patients and their first-degree family members or household contacts was low, with slightly higher infection rates observed among liver transplant recipients than candidates. The widespread and consistent use of personal protective equipment, along with adherence to social distancing measures among both patients and their families, can be contributed to these low infection rates. These results highlighted the importance of stringent protective measures in safeguarding vulnerable populations, such as liver transplant candidates and recipients, particularly during such pandemics as COVID-19.

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Conflict of Interest

No conflict of interest was reported.

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