Correspondence

Parkinson's disease patients may have higher rates of Covid-19 mortality in Iran

ARTICLE INFO

ABSTRACT

Background: Parkinson's disease (PD) patients may be at increased risk of Covid-19 mortality due to the nature of their disease or underlying conditions.

Method: The information of 12,909 Covid-19 patients who were hospitalized during the last eleven months were collected from the data depository of two referral university hospitals. Eighty-seven of these patients were diagnosed with PD, and thirty-one of these PD patients died because of Covid-19. 2132 other deaths occurred in these centers, related to Covid-19 of non-PD patients. Fisher exact test, Chi-square test, and Principle component analysis were used for statistical analysis.

Results: The mortality among PD patients and other hospitalized patients was 35.6% and 19.8%, respectively, and the difference between the mortality of these two groups was found to be statistically significant (p-value<0.01). The mean age of PD patients who passed away was 77.06 ± 7.46, and it was not significantly different from that of alive PD patients (p-value>0.05). Alzheimer's disease as an underlying condition was more frequent in deceased PD patients in comparison to survived PD patients, and this difference was found to be statistically significant (p-value<0.01).

Conclusion: PD patients possess a higher rate of Covid-19 mortality in comparison with other patients hospitalized for Covid-19. PD pathophysiology, advanced age, underlying conditions, and health systems' efficacy may play an essential role in such an outcome.

1. Dear editor

Coronavirus disease 2019 (Covid-19) imposes different rates of mortality on patients with underlying conditions. Patients with neurological diseases such as Parkinson's disease (PD) may have a higher risk of mortality and further complications because of Covid-19 [1]. There is no consensus on if the Covid-19 mortality of PD patients is different from that of the general population, but some risk factors such as advanced age and hypertension play an important role [2,3].

We report the Covid-19 mortality of PD patients hospitalized in two referral centers in Tehran and Isfahan cities in Iran and compare it with Covid-19 mortality of other patients hospitalized in these centers. We collected the relevant data of PD patients and other hospitalized patients from the hospitals' data depository. This study is approved by the ethical committee of Shahid Beheshti University of Medical Sciences (IR.SBMU. RETECH.REC.1399.392) and the ethical committee of Isfahan University of Medical Sciences (IR.MUI.MED.REC.1399.066). A total of 12,909 patients were hospitalized because of severe conditions due to Covid-19 in two centers during the last eleven months, and 87 of these patients were diagnosed with PD before based on the UK brain bank criteria. The hospitalization criteria were either a positive polymerase chain reaction (PCR) test, strong evidence of lung involvement (ground glass appearance on CT scan), supporting Covid-19, or O_2 saturation of below 94%. 31 PD patients and 2132 other hospitalized patients died because of Covid-19 in this period (Fig. 1). The normality of data distribution was assessed by the Anderson-Darling test. Fisher exact test and *t*-test were used for statistical analysis of differences between qualitative and

quantitative data, respectively. Principle component analysis was used for multivariate analyses.

The mean age of PD patients was 75.8 ± 7.3 years, and the mean age of PD patients who passed away was 77.0 ± 7.4 years. Moreover, the mean age of alive PD patients was 75.1 ± 7.2 years, which was not significantly different from that of deceased PD patients (p-value>0.05). The mortality among PD patients and other hospitalized patients was 35.6% and 16.6%, respectively. The difference between the mortality of these two groups was found to be statistically significant (p-value<0.01). The O_2 saturation of deceased PD patients and alive PD patients on the day of admission were 81% and 87%, respectively. Fever, dyspnea, and loss of consciousness were the most frequent Covid-19 symptoms in deceased PD patients. The most frequent underlying conditions among deceased PD patients were Diabetes Mellitus (DM) (32.2%), dementia (32.2%), and Hypertension (HTN) (25.8%). HTN and DM were frequent among alive PD patients. There was no statistically significant difference between the percentage of HTN in survived and deceased PD patients (p-value>0.05). However, dementia was not as frequent as it was in deceased PD patients (8.9%). Dementia was more frequent in deceased PD patients than alive PD patients, and this difference was found to be statistically significant (p-value<0.0001). This finding was in line with other studies that implicated co-occurrence of dementia has a negative impact on Covid-19 outcome [3]. Moreover, dementia has been recognized as an important prognostic factor associated with PD patients' mortality [4]. On the other hand, as dementia can imply long-term PD or advanced age of the patients, they may be the primary cause of mortality in these patients. In this sense, the mean age
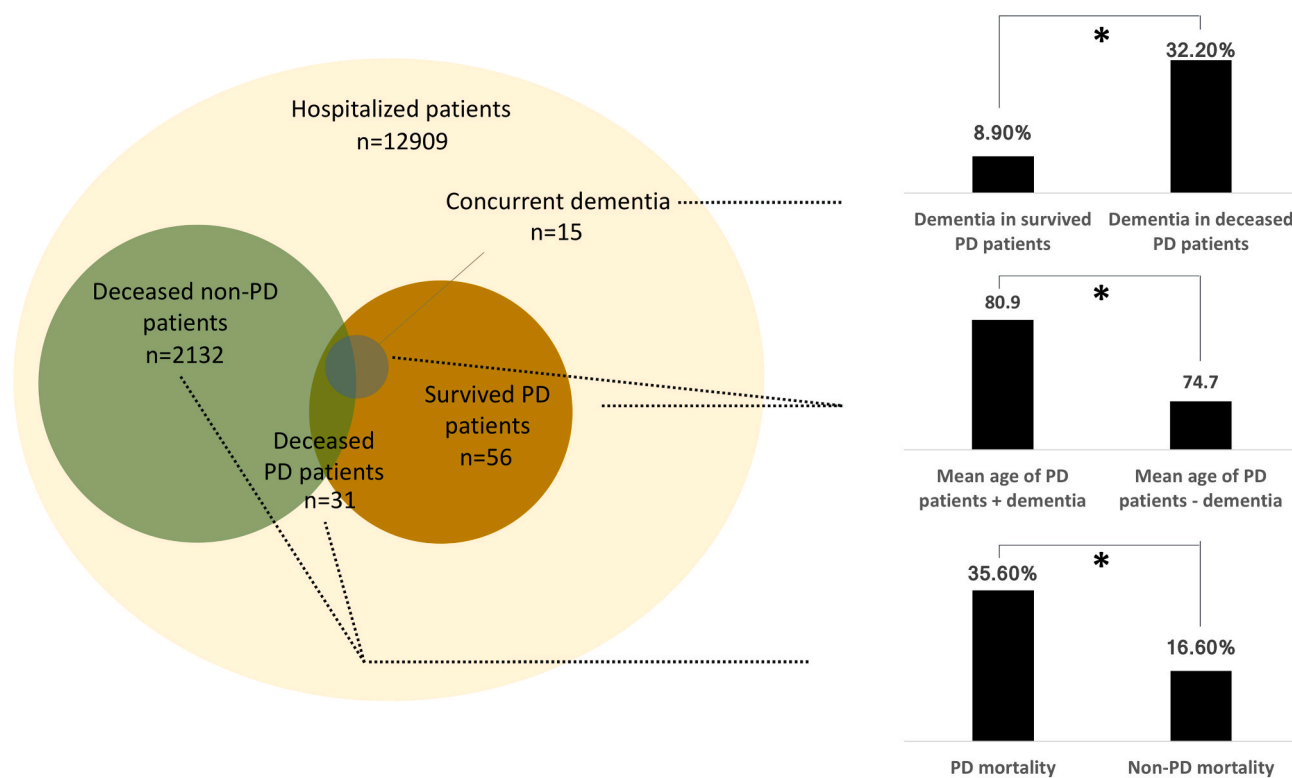
Fig. 1. The schematic illustration of the composition of studied population. The difference between PD and non-PD mortality rate, the mean age of PD patients with and without dementia, and the percentage of dementia in survived and deceased PD patients was statistically significant.

of the patients with dementia was higher than the patients without dementia (p-value$<$0.05). No difference was observed between 1-deceased and alive patients, 2- patients with and without HTN and dementia, and 3- Male and female patients considering age, duration of hospitalization, and O_2 saturation in multivariate analyses.

In our study, PD patients demonstrated higher mortality as a result of SARS-CoV-19 infection in comparison with other hospitalized patients with the same infection. The mortality rate of PD patients with Covid-19, reported in several studies with different methodologies and sample sizes, is varied from 5.7% to 40%. We found a higher mortality rate among PD patients in comparison to other multi-center studies [3,5]. On the other hand, similar to our report, in two recent studies, the mortality rate of PD patients with Covid-19 is reported to be 35.4% [6] and 35.8% [7]; however, their differences from the mortality rate of non-PD patients were significant and insignificant, respectively. This difference may indicate the impact of the health systems' efficacy, the capability of controlling the Covid-19 pandemic, or ethnical factors on Covid-19 outcome in the PD patients [1]. The slow pace of vaccination, poor control of Covid-19 in Iran, lack of telemedicine, highly occupied ICU beds during Covid-19 peaks, and Covid-19 treatments unsustainability are some possible contributing factors that exist in Iran, which might lead to differences in the rate of mortality between studies. This observation can also be interpreted as a consequence of the pathophysiology of PD or other comorbidities that PD patients usually have [3,8]. Moreover, their advanced age may be an essential factor in this manner [3].

In conclusion, it can be suggested that PD patients need tighter preventive and medical measures to survive the current condition. However, the heterogeneity of the non-PD group as a limitation of this study necessitates the need for more directed investigations for evaluating the outcome of Covid-19 in PD patients. In addition, the methodology and limited sample size of this study might prevent further general conclusions about the mortality of PD patients with Covid-19 and contributing factors.

2. Authors' roles

Conceptualization and study design: MS, STF. Data collecting: MS, ME, FA, DO. Statistical Analysis: STF. Writing the manuscript: STF, ZA. Review: STF, MS.

3. Financial disclosure

None of the authors have received any funding of any kind for either this project or other projects.

Declaration of competing interest

Authors declare no conflicts of interest.

References

[1] S.M. Papa, P. Brundin, V.S. Fung, U.J. Kang, D.J. Burn, C. Colosimo, H.L. Chiang, R.N. Alcalay, C. Trenkwalder, M.-S.I. Committee, Impact of the COVID-19 pandemic on Parkinson's disease and movement disorders, Mov. Disord. 6 (10.1002) (2020).

[2] A. Fasano, E. Cereda, M. Barichella, E. Cassani, V. Ferri, A.L. Zecchinelli, G. Pezzoli, COVID-19 in Parkinson's disease patients living in lombardy, Italy, Mov. Disord. 35 (7) (2020) 1089–1093.

[3] A. Fasano, A.E. Elia, C. Dallocchio, M. Canesi, D. Alimonti, C. Sorbera, A. Alonso-Canovas, G. Pezzoli, Predictors of COVID-19 outcome in Parkinson's disease, Park. Relat. Disord. 78 (2020) 134–137.

[4] A.D. Macleod, K.S. Taylor, C.E. Counsell, Mortality in Parkinson's disease: a systematic review and meta-analysis, Mov. Disord. 29 (13) (2014) 1615–1622.

[5] E. Del Prete, A. Francesconi, G. Palermo, S. Mazzucchi, D. Frosini, R. Morganti, P. Coleschi, L.M. Raglione, P. Vanni, S. Ramat, Prevalence and impact of COVID-19 in Parkinson's disease: evidence from a multi-center survey in Tuscany region, J. Neurol. 268 (4) (2021) 1179–1187.

[6] R. Scherbaum, E.H. Kwon, D. Richter, D. Bartig, R. Gold, C. Krogias, L. Tönges, Clinical Profiles and Mortality of COVID-19 Inpatients with Parkinson's Disease in Germany, Movement Disorders, 2021.

[7] R. Parihar, V. Ferastraoaru, A.S. Galanopoulou, H.L. Geyer, D.M. Kaufman, Outcome of hospitalized Parkinson's disease patients with and without COVID-19, Movement Disorders Clinical Practice (2021).

[8] R. Bhidayasiri, S. Virameteekul, J.-M. Kim, P.K. Pal, S.-J. Chung, COVID-19: an early review of its global impact and considerations for Parkinson's disease patient care, Journal of movement disorders 13 (2) (2020) 105.

Mehri Salari[a], Masoud Etemadifar[b], Farzad Ashrafi[a], Davood Ommi[a], Zahra Aminzade[a,c], Sepand Tehrani Fateh[a,c,*]

[a] *Functional Neurosurgery Research Center, Shohada-e Tajrish Comprehensive Neurosurgical Center of Excellence, Shahid Beheshti University of Medical Sciences, Tehran, Iran*

[b] *Department of Functional Neurosurgery, Medical School, Isfahan University of Medical Sciences, Isfahan, Iran*

[c] *School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran*

[*] Corresponding author. Koodakyar st., Daneshjoo Blvd., Velenjak, Tehran, Iran.

E-mail address: sepand.tf@gmail.com (S. Tehrani Fateh).