



Impact of the COVID-19 pandemic on depressive symptoms in Japanese patients undergoing hemodialysis

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The coronavirus disease 2019 (COVID-19) continues to spread worldwide. To prevent further spread of COVID-19, most countries have imposed strict lockdowns, forcing people to socially distance themselves from family and friends. Surveys indicate that anxiety and depression have increased due to the COVID-19 outbreak [1].

Hemodialysis patients have a higher prevalence of depressive symptoms compared to age-matched people [2]. Moreover, hemodialysis patients and patients with chronic conditions are at a higher risk of contracting severe clinical COVID-19 [3]. We hypothesized that these factors may result in symptoms such as anxiety and depression. However, data regarding the impact of the COVID-19 pandemic on depressive symptoms in dialysis patients are lacking. Therefore, this study investigated the changes in depressive symptoms before and during COVID-19 in Japanese patients undergoing hemodialysis.

This longitudinal study comprised clinically stable outpatients who underwent maintenance hemodialysis therapy three times a week between April 2019 and March 2021 at a Japanese dialysis center. The exclusion criteria were: being hospitalized during the 3 months before the study and not understanding the questionnaire items sufficiently for allowing evaluation of depressive symptoms.

Baseline data were collected between April 2019 and March 2020, before the declaration of the COVID-19 emergency by the Japanese government. Follow-up measurements during the pandemic were performed between July 2020 and March 2021. Data regarding clinical characteristics were obtained from medical records.

Depressive symptoms were assessed using the short version of the Center for Epidemiologic Studies Depression Scale (CES-D) [4]. The CES-D short version comprises 10 items scored on a scale of 0–3; the total score ranges from 0 to 30, with higher scores indicating higher depressive symptoms. The presence of depressive symptoms was defined as a score ≥ 10 . Subgroup analyses based on sex, age, employment status, hemodialysis vintage, living situation, and comorbidity score were also conducted to assess differences in depressive symptoms before and during the COVID-19 pandemic. Wilcoxon-signed rank test and McNemar test were used for analyses with a statistical significance of $P < 0.05$.

A total of 347 Japanese outpatients receiving hemodialysis were assessed for eligibility; 142, who met the inclusion criteria and whose complete data were available, were included in the study. Patients' mean age was 66.3 ± 10.8 years. The median of hemodialysis vintage was 8.0 years (interquartile range [IQR]: 2.0–16.0) and the median mini-mental state examination score was 26 (IQR: 24–29).

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There were no significant differences in the median CES-D score and the prevalence of depressive symptoms before (median and IQR: 6.0 [4.8–10.0], 26.1%) and during (median and IQR: 7.0 [5.0–10.0], 26.1%) the COVID-19 pandemic. Subgroup analysis also showed no significant difference in the median CES-D score and in the prevalence of depressive symptoms before and during the COVID-19 pandemic (Table 1).

In contrast to our hypothesis that the COVID-19 pandemic and its containment measures would increase the prevalence of depressive symptoms in hemodialysis patients, we observed no significant change in the prevalence of depressive symptoms before and during the COVID-19 pandemic. These results are consistent with a previous study that investigated the impact of the COVID-19 pandemic on the health-related quality of life (QOL) of hemodialysis patients and showed no change in the mental component score during

Table 1 Changes in CES-D scores before and during the COVID-19 pandemic

	Before COVID-19		During COVID-19		<i>P</i> -value ^a
	Median (IQR)	<i>n</i> (%)	Median (IQR)	<i>n</i> (%)	<i>P</i> -value ^b
Overall (<i>n</i> = 142)	6.0 (4.8–10.0)	37 (26.1)	7.0 (5.0–10.0)	37 (26.1)	0.55 1.00
Sex					
Men (<i>n</i> = 82)	6.0 (4.0–10.0)	23 (28.1)	7.0 (4.8–9.3)	20 (24.4)	0.66 0.44
Women (<i>n</i> = 60)	7.0 (5.0–9.0)	14 (23.3)	7.0 (5.0–10.0)	17 (28.3)	0.15 0.44
Age (years)					
< 60 (<i>n</i> = 35)	6.0 (4.0–10.0)	9 (25.7)	7.0 (4.0–11.0)	10 (28.6)	0.63 0.71
60–74 (<i>n</i> = 72)	6.0 (4.0–9.0)	17 (23.6)	7.0 (4.3–10.0)	19 (26.4)	0.36 0.59
≥ 75 (<i>n</i> = 35)	8.0 (5.0–11.0)	11 (31.4)	7.0 (6.0–9.0)	8 (22.9)	0.62 0.32
Employment status					
Employed (<i>n</i> = 72)	6.0 (4.0–9.0)	17 (23.6)	7.0 (4.3–9.0)	14 (19.4)	0.93 0.44
Unemployed (<i>n</i> = 70)	6.5 (5.0–10.0)	20 (28.6)	7.0 (5.0–11.0)	23 (32.9)	0.41 0.44
Hemodialysis vintage (years)					
< 8 (<i>n</i> = 71)	7.0 (5.0–11.0)	23 (32.4)	7.0 (5.0–10.0)	20 (28.2)	0.84 0.44
≥ 8 (<i>n</i> = 71)	6.0 (4.0–9.0)	14 (19.7)	6.0 (4.0–9.0)	17 (23.9)	0.59 0.44
Living situation					
Living with others (<i>n</i> = 102)	6.0 (4.0–9.0)	23 (22.6)	7.0 (4.8–9.0)	21 (20.6)	0.59 0.67
Living alone (<i>n</i> = 40)	7.0 (5.0–12.0)	14 (35.0)	8.0 (5.0–11.0)	16 (40.0)	0.87 0.48
Comorbidity score (points)					
6 < (<i>n</i> = 62)	6.0 (3.8–9.3)	15 (24.2)	7.5 (3.0–10.0)	17 (27.4)	0.37 0.64
≥ 6 (<i>n</i> = 80)	7.0 (5.0–10.0)	22 (27.5)	7.0 (5.0–9.8)	20 (25.0)	0.99 0.56

Values are expressed as median (interquartile range) of CES-D score, and number and percentage of patients with a CES-D score ≥ 10

CES-D Center for Epidemiologic Studies Depression Scale

^aWilcoxon-signed rank test conducted for significant differences between conditions before and during the COVID-19 pandemic

^bMcNemar test conducted for significant differences between conditions before and during the COVID-19 pandemic

the pandemic [5]; however, the questionnaire used to measure QOL—the 12-item Short Form—has only one item related to depression. This previous study conjectured that the unchanged mental health of patients receiving hemodialysis was because they had developed coping strategies that helped them to cope also with the COVID-19 pandemic.

Hemodialysis patients adjust their lifestyle behaviors as they must deal with fluid restriction, polypharmacy, and dialysis therapy; they continuously encounter difficulties and adversities. Specifically, the participants of our study routinely received hemodialysis therapy thrice a week. Therefore, it is possible that they escaped complete isolation by interacting with other patients on hemodialysis and medical staff, and received more attentive care for physical and mental conditions than healthy adults and patients with other diseases during the COVID-19 pandemic. Owing to this, patients on hemodialysis may have been able to respond more flexibly to the pandemic.

Our findings may not be generally applicable because of our small sample size, retrospective, and single-center study design, which included only Japanese hemodialysis patients. Moreover, only the 10-item version of the CES-D scale was used to evaluate psychiatric disorders. More detailed assessments including anxiety, apathy, and cognitive function will be necessary in the future.

In conclusion, in our setting, depressive symptoms in hemodialysis patients before and during the COVID-19 pandemic did not differ. However, as the pandemic is likely to continue and future studies should assess changes in depressive symptoms among the fragile population of patients on hemodialysis.

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Declarations

Conflict of interest The authors have no conflicts of interest to declare.

Ethical approval This study was conducted in accordance with the tenets of the Declaration of Helsinki and was approved by the Research Ethics Committee of Kitasato University (2017-026B-2).

References

1. Ettman CK, Abdalla SM, Cohen GH, Sampson L, Vivier PM, Galea S (2020) Prevalence of depression symptoms in US adults before and during the COVID-19 pandemic. *JAMA Netw Open* 3:e2019686. <https://doi.org/10.1001/jamanetworkopen.2020.19686>
2. Camacho-Alonso F, Cánovas-García C, Martínez-Ortiz C, De la Mano-Espinosa T, Ortuño-Celdrán T, Marcello-Godino JI, Ramos-Sánchez R, Sánchez-Siles M (2018) Oral status, quality of life, and anxiety and depression in hemodialysis patients and the effect of the duration of treatment by dialysis on these variables. *Odontology* 106:194–201. <https://doi.org/10.1007/s10266-017-0313-6>
3. Zou R, Chen F, Chen D, Xu CL, Xiong F (2020) Clinical characteristics and outcome of hemodialysis patients with COVID-19: a large cohort study in a single Chinese center. *Ren Fail* 42:950–957. <https://doi.org/10.1080/0886022X.2020.1816179>
4. Andresen EM, Malmgren JA, Carter WB, Patrick DL (1994) Screening for depression in well older adults: evaluation of a short form of the CES-D (Center for Epidemiologic Studies Depression Scale). *Am J Prev Med* 10:77–84. [https://doi.org/10.1016/S0749-3797\(18\)30622-6](https://doi.org/10.1016/S0749-3797(18)30622-6)
5. Bonenkamp AA, Druiventak TA, van der Sluijs A, van Ittersum FJ, van Jaarsveld BC, Abrahams AC (2021) The impact of COVID-19 on the mental health of dialysis patients. *J Nephrol* 34:337–344. <https://doi.org/10.1007/s40620-021-01005-1>

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