



## Depressive symptoms in community-dwelling older adults before and during the 2019 coronavirus diseases (COVID-19) pandemic

Yoko Aihara<sup>1</sup>,  
Chulaporn Sota<sup>2</sup>

### Abstract

Social connection is strongly associated with mental health in older adults. As a result of voluntary self-isolation during the coronavirus disease 2019 (COVID-19) pandemic, mental health may deteriorate. This cohort study examined the cumulative incidence of and factors associated with depressive symptoms before and during the COVID-19 pandemic among community-dwelling older adults (65 years and older). The data used from 569 participants in 3 waves (May to June, October to December 2019, and May to July 2020) living in urban areas in Japan. The Geriatric Depression Scale was used to assess depressive symptoms. Questionnaire regarding participants' demographic characteristics, social connectedness, and cognitive impairments were also asked. Logistic regression model was used to identify the factors associated with depressive symptoms.

Depressive symptoms before and during the pandemic were present in 25.8% and 32.3% of respondents, respectively. Older adults who had dementia (odds ratio [OR] = 1.17, 95% confidence interval [CI] = 1.12–4.58) and those who did not have adviser (OR = 2.30, 95% CI = 1.00–5.29) and were more likely to develop depressive symptoms during the pandemic period. The findings suggest that people with dementia may have significant difficulty coping with the COVID-19 pandemic and related policies including keep social distance. Alternative ways to provide social activities and social connectedness with for people with dementia and those individuals without personal adviser are urgently needed to minimise the adverse effects of the pandemic on mental health.

**Keywords:** Depressive symptoms, older adults, COVID-19, pandemic

### Introduction

Coronavirus disease 2019 (COVID-19) not only threatens lives but also necessitates behavioural changes to avoid transmission of the virus. In recent studies, the COVID-19 pandemic has been reported to affect psychological health and

to increase the prevalence of poor psychological symptoms (1-4). The ongoing uncertainty related to the pandemic and dramatic behavioural changes required by social distancing and stay-at-home strategies may cause deterioration in mental and psychological health (5, 6) and suggest that the impact

<sup>1</sup>Kobe Gakuin University, Kobe, Japan

<sup>2</sup>Faculty of Science and Technology College of Asian Scholar, Thailand



of COVID-19 pandemic is more severe in young adults than in older adults (1, 7). In accordance with the increased unemployment rate and economic downturn related to restrictions on leaving home may have more serious impact on younger adults. However, older adults are also severely impacted by requirements for behavioural changes related to the COVID-19 pandemic as they are vulnerable to the severe effects of COVID-19.

Older adults both at home and in residential care facilities are recommended to refrain from contact with their family, friends and caregivers. In older adults, self-isolation is detrimental to psychological health (8). Social connectedness is significantly important for older adults' psychological health in preventing or reducing the degree of depression and anxiety (9). Furthermore, the chances of contracting the virus cause persistent stress among older adults. Older adults living in areas where severe acute respiratory syndrome (SARS) was highly prevalent were more likely to suffer from posttraumatic stress disorder than middle aged people in those areas or people living in areas of low SARS prevalence (10). As a consequence, persistent psychological disorders, such as depressive symptoms can lead to mortality (11) and increase the need for long-term care (12). Feelings of social and emotional loneliness were increased among the Dutch community-dwelling older adults; however, their mental health in 2019, before the pandemic, and that during the COVID-19 pandemic did not change significantly (13). Currently, our knowledge on the mental health of older adults living in Asian countries, which have the highest rate of aging globally, during the COVID-19 pandemic is limited.

In Japan, the government declared a state of emergency on April 7, 2020 and requested citizens to refrain from leaving their homes. This policy is not compulsory, as in many other countries, in which going outside is restricted, in a strategy commonly called 'lockdown'.

However, most people in Japan followed government recommendations for avoiding COVID-19, known as the 'three Cs' —closed spaces with poor ventilation, close contact settings and confined and closed places—even after the state of emergency ended on May 25, 2020. By following this strategy among older adults in long-term care facilities, the behavioural changes decrease both time spent in common areas and daily walking distance (14). However, the change in psychological status with COVID-19 pandemic has not been extensively studied in community-dwelling older adults. This cohort study aims to compare prevalence of and factors associated with depressive symptoms before and during the COVID-19 pandemic among community-living older adults in Japan.

### **Objective**

This cohort study aims to compare prevalence of and factors associated with depressive symptoms before and during the COVID-19 pandemic among community-living older adults in Japan.

### **Methods**

#### **Participants**

The study participants were people aged 65 years and older who lived in two urban areas in Hyogo Prefectures, Japan. A self-administered



questionnaire was posted to all 10,143 older adults living in these areas. In total, 2269 older adults responded to a baseline survey conducted between May 1 and June 30, 2019. Among the respondents, 1165 older adults agreed to participate in the second-wave survey, which was conducted between October 1 and December 31, 2019 and included 854 individuals who responded. The baseline and second-wave survey methods have been described elsewhere (15,16).

Third-wave survey was conducted during May and July 2020, and 596 persons responded (response rate = 70%). The data collected by the baseline and second-wave surveys were defined as pre-pandemic data, whereas those collected by the third-wave survey were defined as pandemic data.

#### **Measures**

The outcome variable is depressive symptoms which were assessed using the Geriatric Depression Scale (GDS). Five items of the GDS (17), which have been validated in the Japanese version (18) were used in the second-wave survey. The scores on the GDS-5 that indicates having depressive symptoms is 2/3. In the third-wave survey, Japanese version of 15-items of GDS was used (19). Cut-off scores for GDS-15 of depression are as follows: Normal 0–4, Mild 5–9, Moderate to Severe 10–15.

Explanatory variables were social connections and health status. To assess social connectedness, respondents were asked whether they have advisers and get a consultation (yes or no). Health status was assessed by whether the participants had comorbidities and cognitive impairment. To assess for dementia, the Dementia

Assessment Sheet for Community-based Integrated Care System 21-items (DASC-21) was used; this instrument was shown to have sufficient reliability and validity detecting dementia in the community (20). The cut-off score on the DASC-21 that indicates dementia is 30/31.

Participants' age, gender, family size, educational level, and type of residence (own, rented, or unit of public housing) were included as covariates. Data for all these explanatory variables were collected during the baseline survey.

#### **Ethics**

All respondents received written explanations of the study protocol. We then obtained written informed consent from those who agreed to participate. This study received ethical approval by the Ethics Committee of Kobe Gakuin University (protocol number Sourin-18-16, approved on 6 February 2019).

#### **Statistical Analysis**

A total of 823 respondents for second survey, 586 respondents for third survey and 569 respondents completed GDS data for all waves. Thus, their responses were analysed. The prevalence of depressive symptoms was calculated to obtain descriptive statistics, and then bivariate chi-squared test was applied to identify the factors associated with depressive symptoms before and during the pandemic. Finally, we conducted multivariable logistic regression model to assess factors associated with development of depressive symptoms during the pandemic of COVID-19. All the statistical analyses were conducted using STATA 16.0 (StataCorp, College Station, TX, USA) and set the significant level at <5%.

**Results****Prevalence of Depressive Symptoms Before and During Pandemic**

The prevalence of depressive symptoms before the pandemic was 29.2%. During the pandemic, 136 (23.2%) participants had mild depression and 54 (9.2%) participants had moderate to severe depressive symptoms.

Table 1 presents demographic characteristics and factors associated with depressive symptoms before and during the pandemic. In general, having more resources and poor health status were associated with depressive symptoms, both before and during the pandemic.

Respondents lived alone, did not have advisers and those who did not receive consultation from others were more likely to have depressive symptoms than those who lived with family, had adviser, and received consultation from others. In addition, respondents had comorbidities and dementia were higher prevalence of depressive symptoms than those who did not have comorbidities and dementia. Lower educational level and types of residence were associated with depressive symptoms before the pandemic, whereas there were no statistical associations between educational levels, types of residence and depression during the pandemic.

**Table 1.** Participants' demographic characteristics and factors associated with depressive symptoms before and during the pandemic of COVID-19

Variables	Before the pandemic		During the pandemic	
	N (%)		N (%)	
	Total (n = 823)	Depressive symptoms (n = 240)	Total (n = 586)	Depressive symptoms (n = 190)
<b>Age (years)</b>				
65-74	246 (29.9)	67 (27.2)	168 (28.7)	52 (31.0)
≥ 75	577 (70.1)	173 (30.0)	418 (71.3)	138 (33.0)
<b>Gender</b>				
Male	386 (46.9)	111 (28.8)	279 (47.6)	86 (30.8)
Female	437 (53.1)	129 (29.5)	307 (52.4)	104 (33.9)
<b>Educational level</b>				
Elementary/junior high school	148 (18.0)	63 (42.6) <sup>c</sup>	95 (16.2)	37 (39.0)
High school	355 (43.1)	104 (29.3)	255 (43.5)	90 (35.3)
University	316 (38.4)	71 (22.5)	235 (40.1)	63 (26.8)
Missing	4 (0.5)	2 (50.0)	1 (0.2)	0
<b>Living structure</b>				
Living alone	273 (33.2)	91 (33.3) <sup>a</sup>	214 (36.5)	87 (40.7) <sup>b</sup>
Living with family members	545 (66.2)	146 (26.8)	368 (62.8)	101 (27.5)
Missing	5 (0.6)	3 (60.0)	4 (0.7)	2 (50.0)



Variables	Before the pandemic		During the pandemic	
	N (%)		N (%)	
	Total (n = 823)	Depressive symptoms (n = 240)	Total (n = 586)	Depressive symptoms (n = 190)
<b>Type of residence</b>				
Own house	547 (66.5)	141 (25.8) <sup>a</sup>	385 (65.7)	117 (30.4)
Rental house	138 (16.8)	48 (34.8)	100 (17.1)	39 (39.0)
Unit of public housing	136 (16.5)	50 (36.8)	100 (17.1)	34 (34.0)
Missing	2 (0.2)	1 (50.0)	1 (0.2)	0
<b>Presence of comorbidities</b>				
No	206 (25.0)	42 (20.4) <sup>b</sup>	147 (25.1)	36 (24.5) <sup>a</sup>
Yes	591 (71.8)	187 (31.6)	422 (72.0)	146 (34.6)
Missing	26 (3.2)	11 (42.3)	17 (2.9)	17 (2.9)
<b>Dementia</b>				
Scores of DASC-21 <31	687 (83.5)	169 (24.6) <sup>c</sup>	505 (86.2)	136 (26.9) <sup>c</sup>
Scores of DASC-21 31+	109 (13.2)	59 (54.1)	63 (10.8)	45 (71.4)
Missing	27 (3.3)	12 (44.4)	18 (3.1)	9 (50.0)
<b>Having adviser</b>				
Yes	699 (84.9)	178 (25.5) <sup>c</sup>	513 (87.5)	148 (28.9) <sup>c</sup>
No	94 (11.4)	48 (51.1)	52 (8.9)	31 (59.6)
Missing	30 (3.7)	14 (46.7)	21 (3.6)	11 (52.4)
<b>Receiving consultation from others</b>				
Yes	613 (74.5)	137 (22.4) <sup>c</sup>	453 (77.3)	113 (24.9) <sup>c</sup>
No	173 (21.0)	89 (51.5)	109 (18.6)	67 (61.5)
Missing	37 (4.5)	14 (37.8)	24 (4.1)	10 (41.7)

Abbreviations: COVID-19, coronavirus disease 2019; DASC-21, Dementia Assessment Sheet for Community-based integrated Care system 21-Items.

a p-value < 0.05, b p-value < 0.01, c p-value < 0.001

#### Factors Associated with Development of Depressive Symptoms

Of the 422 respondents without depressive symptoms before the pandemic, 69 (16.4%) developed mild depressive symptoms and

10 (2.4%) developed moderate to severe depressive symptoms during the pandemic, which represents the cumulative incidence. On the other hand, among the 147 respondents with depressive symptoms before the pandemic, depressive symptoms disappeared in 42 (28.6%) during the pandemic.

Table 2 lists the results of logistic regression analysis for identifying factors associated with development of depressive symptoms.



A univariable logistic regression showed respondents with dementia, without advisers and did not receive consultation from others were at higher risk for depressive symptoms. The analysis after controlling for all factors showed that the respondents with dementia and without advisers were more likely to develop depressive symptoms than those without dementia and with advisers (OR 2.27, 95% CI 1.12—4.58, OR 2.30, 95% CI 1.00—5.30, respectively).

**Table 2.** Factors associated with development of depressive symptoms during COVID-19 pandemic (N=569)

Variables	Odds ratio (95% CI)	
	Univariable logistic regression	Multivariable logistic regression
<b>Age</b>	1.03 (0.99—1.06)	1.02 (0.98—1.06)
<b>Gender</b>		
Male	Ref.	Ref.
Female	1.12 (0.70—1.82)	1.20 (0.71—2.03)
<b>Educational level</b>		
Elementary school/ junior high school	Ref.	Ref.
≥ High school	0.93 (0.49—1.78)	0.93 (0.50—1.87)
<b>Living situation</b>		
With family members	Ref.	Ref.
Alone	1.06 (0.65—1.73)	0.86 (0.49—1.51)
<b>Type of residence</b>		
Own house	Ref.	Ref.
Rental house	0.84 (0.43—1.63)	0.79 (0.38—1.64)
Unit of public housing	0.93 (0.48—1.79)	0.92 (0.43—1.95)
<b>Presence of comorbidities</b>		
No	Ref.	Ref.
Yes	0.94 (0.48—1.83)	0.78 (0.39—1.55)
<b>Dementia</b>		
Scores of DASC-21 <31	Ref.	Ref.
Scores of DASC-21 31+	2.89 (1.55—5.40)	2.27 (1.12—4.58)
<b>Having adviser</b>		
Yes	Ref.	Ref.
No	2.73 (1.40—5.36)	2.30 (1.00—5.30)
<b>Receiving consultation from others</b>		
Yes	Ref.	Ref.
No	1.95 (1.13—3.38)	1.14 (0.56—2.35)

Note: CI, confidence interval; COVID-19, coronavirus disease 2019; DASC-21, Dementia

Assessment Sheet for Community-based integrated Care system 21-Items; Ref., reference value



## Discussion

This cohort study revealed that the prevalence of depressive symptoms among community-dwelling older adults in Japan slightly increased during the COVID-19 pandemic. The cumulative incidence of depressive symptoms during the pandemic was 18.7%. After the great east earthquake and tsunami in Japan in 2011, 16% of earthquake survivors aged 65 years and older developed depressive symptoms (21). Results of the present study further supplement the findings of prior extensive studies that have examined the impact of traumatic events such as natural disasters on mental health of older adults (22). The prevalence of depressive symptoms in the US older adults showed an approximately 2-fold increase during the pandemic (1), whereas the mental health status among Dutch community-dwelling older adults remained stable (13). There are several possible reasons for this disagreement. First, the instruments used to assess depressive symptoms differed among the studies. Second, with regard to increase in the prevalence of depressive symptoms among the study participants, the prevalence of depressive symptoms before the pandemic in the study community was slightly lower than the rate of 33.5% reported in a previous study on older Japanese population using the same instrument (12).

The present study results also suggested that older adults with dementia were at higher risk of developing depressive symptoms during the pandemic than those without dementia. A telephone interview survey conducted with patients of an Italian memory clinic revealed that more than half the participants experienced

worsening of their mental health status (i.e. apathy, depression and agitation) (23). Depression and dementia are two major mental illnesses among older adults, and several studies suggest that depression is a risk factor for and possible prodrome of dementia (24-26). The detailed mechanism by which depressive symptoms develop as a result of social distancing in people with dementia is unclear. However, people with dementia are assumed to be vulnerable to adverse effects of environmental and social changes and hence to have more psychological stress.

Receiving and giving social support may prevent the development of depressive symptoms among older survivors of traumatic events (21). We also found that respondents who had advisers had less likely to develop depressive symptoms during the pandemic. Perceived and received social support are significantly associated with less severe depressive symptoms among community-dwelling older adults in Asia (27). Older people who receive social support may therefore experience less emotional distress from the COVID-19 pandemic. Information related to COVID-19 is up-dated almost every day and has a wide effect on mental health among people in general. Therefore, giving accurate information and taking precaution with regard to COVID-19, including treatment, hygiene and wearing masks, are also important in reducing adverse effect on mental health (4).

It is well known that the engagement in physical, social and intellectual activities reduces the risk of dementia (28). In this study, cognitive function during the pandemic was not assessed; therefore, the change in cognitive function from before to during the COVID-19 pandemic could not



be evaluated. Results of a qualitative study conducted in United Kingdom indicated that the closure of social services negatively affected people with dementia and unpaid caregivers (29). To date, the decision of whether to keep social distance to prevent virus transmission or to keep social connection to improve mental health is a dilemma. Our findings suggest that enhancing remote support systems especially for people with dementia should be prioritised.

This study had some limitations. First, to assess aspects of mental health such as depressive symptoms and cognitive functions, self-report measurements were used; therefore, clinical symptoms of depression were not assessed. Second, the data were collected only one urban area and thus may not represent the whole country, especially in as much as the incident of COVID-19 transmission varies across the country. Comparisons of regions of high and low rates of transmission are needed to assess the effects of contagious diseases on mental health.

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