Depression and Related Factors in Korean Adults During the Coronavirus Disease 2019 Outbreak

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Objective We aimed to determine the status of depression and its related factors among adult Koreans during the coronavirus disease 2019 (COVID-19) outbreak.

Methods We used data from the 2020 Korea Community Health Survey (KCHS). We assessed depressive feelings and symptoms using the Patient Health Questionnaire-9 (PHQ-9 ≥10). In addition, we assessed general and COVID-19–related characteristics, including isolation due to and concerns about COVID-19. We analyzed the data using chi-square tests and multiple logistic regression analyses.

Results The rates of depressive feelings and symptoms were 5.9% and 2.9%, respectively. Of the adult respondents, 68.5% were concerned about COVID-19, while 75.9% were concerned about economic harm due to COVID-19. The adjusted odds ratios for depressive symptoms assessed using the PHQ-9 were significantly high among women responders, adults aged 19–44 years, low-income households, those who experienced COVID-19–related symptoms, and those concerned about death due to COVID-19 and economic harm due to COVID-19. Similar results were obtained for depressive feeling.

Conclusion Concerns related to COVID-19 infection are related to depression. This suggests that COVID-19 significantly affects mental health. Therefore, during public health crises, such as new communicable diseases, mental health and the incidence of the infectious disease require assessment and monitoring. **Psychiatry Investig 2022;19(11):965-972**

Keywords Communicable diseases; COVID-19; Depression; Health surveys; Pandemic; Patient Health Questionnaire.

INTRODUCTION

In recent years, new infectious diseases have become a major global public health threat. The outbreak of the novel coronavirus was initially reported by the World Health Organization (WHO) on December 31, 2019. It was first reported in Wuhan, Hubei province; thereafter, it spread rapidly, leading to the WHO's declaration of coronavirus disease 2019 (COVID-19) as a Public Health Emergency of International Concern on January 30, 2020.[1] As of March 28, 2022, more than 480 million people have been infected with COVID-19, while 6.12 million deaths have been reported globally.[1] The rapidly rising global incidence of COVID-19 and rapid changes in daily lives have left people alarmed and frightened.[2]

In Korea, the first confirmed case of COVID-19 in Incheon was announced on January 19, 2020.[3] On March 38, 2022, the cumulative numbers of confirmed cases and deaths were 12,003,054 and 15,186, respectively, while the daily number of newly confirmed cases was approximately 200,000. As the incidence of COVID-19 increased, so did anxiety and depression.[4]

In response to the COVID-19 pandemic, the government has adopted several health strategies, including working from home, social distancing, and self-quarantine.[5] Infection control measures in Korea included online movement tracking with immediate alerts and notifications, social distancing, drive-through COVID-19 testing, supply and distribution of protective equipment in the public sector, app development for a COVID-19 screening questionnaire, and a movement map generated using Global Positioning System records from cellular phone or credit card records.[6] Korea was one of the countries that was greatly affected in the early stages of the COVID-19 epidemic, but it was regarded as an infection control model to fight the pandemic.[7] Due to the prolonged COVID-19 outbreak, the application of these quarantine measures is being extended.

While these strategies are crucial for preventing disease transmission, sudden restrictions on people's daily lives could negatively affect their mental health.[8] In a systematic review focused on the general population, the prevalence of mental conditions, including stress (29.6%), anxiety (31.9%), and depression (33.7%), was high during the COVID-19 pandemic.[9] The rate of stress from COVID-19 in Canada was 84.9%,[10] while in Saudi Arabia, 23.6% of the respondents reported depression, anxiety, and stress symptoms due to COVID-19,[11] and 59% of adult German respondents reported fears related to COVID-19.[12] In a meta-analysis of depression among Chinese patients with COVID-19, the prevalence reached 45%.[13] Similarly, new infectious diseases, such as severe acute respiratory syndrome and Middle East respiratory syndrome, have been reported to increase stress and depression.[14,15] These results suggest the need to monitor and evaluate the mental health of the general public during the COVID-19 outbreak.

Various risk factors for poor mental health status have been investigated. In one study, anxiety was higher among women, non-medical workers, and pregnant women than among other populations.[16] In another study, due to anxiety about COVID-19 infection, many participants said that they would not go to the hospital if their disease progressed.[17] Another study found that depression was higher in individuals with poor health and finances and less social support.[18] Thus, anxiety and depression increase in various ways due to COVID-19.

However, there is limited information on the mental health status of the general Korean population during the COVID-19 outbreak. Previous Korean studies addressing the risk factors for depression during the COVID-19 outbreak were limited to studies with small study populations and healthcare workers or in specific regions.[19,20] Therefore, we aimed to investigate Korean adults' depression status and related factors during the COVID-19 outbreak.

METHODS

Data source and study participants

We used data from the 2020 Korea Community Health Survey, a cross-sectional nationwide survey conducted by the Korea Centers for Disease Control and Prevention (KCDC). The Korea Community Health Survey (KCHS) data were collected via interviews with all adults (aged ≥19 years) in the sample households. Nine hundred people per community were surveyed, with a total of 220,000 people surveyed yearly. Sampling was performed to ensure proportional sampling probability with respect to household size based on the number of households by home type within tong, ban, and ri, while the secondary sample households were selected via systematic sampling. We analyzed data from 229,236 participants as a representative sample. The 2020 KCHS was conducted from August to October.[10] The KCHS protocol was approved by the Institutional Review Board of the KCDC (2016-10-01-P-A). Trained health interviewers visited selected households and surveyed all household members aged ≥19 years in the sample household through computer-assisted personal interviews. Informed consent was obtained from all individual participants included in the study.[21] Before the survey, all interviewers underwent COVID-19 tests, and only those with negative results were allowed to participate in the survey. During the survey period, all the interviewers checked their health conditions daily, including fever, cough, and symptoms related to COVID-19; those with symptoms were excluded from the survey. In addition, the interviewers strictly followed personal hygiene rules such as hand disinfection and mask-wearing.

General characteristics

General characteristics included gender (men and women), age (19−44, 45−64, and ≥65), household income (≤99, 100−299, 300−499, and ≥500) in units of ten thousand won/month, residence (urban and rural), household generation (1st, 2nd, and 3rd), frequency of alcohol drinking (never, <1 per year, 1−4 per month, and ≥2 per week), smoking status (never, former, and current), self-rated health (good and poor), hypertension (yes and no), diabetes (yes and no), hospitalization due to COVID-19 (yes and no), and COVID-19 related symptoms (yes and no). We defined hypertension and diabetes as a history of a diagnosis by a physician; quarantine or hospitalization due to COVID-19 as a yes response to the question, "Have you ever been quarantined or hospitalized for COVID-19?" and previously experienced COVID-19−related symptoms as a yes response to the question, "Have you had respiratory symptoms such as a fever or a cough in the past three months?"

COVID-19 infection-related concerns

COVID-19 infection-related concerns comprised five items: 1) COVID-19 infection: "I am worried that I will be infected with COVID-19;" 2) death due to COVID-19: "I am worried that I could die if I contracted COVID-19;" 3) criticism from surrounding people due to COVID-19 infection: "I am worried that if I am infected with COVID-19, I will be criticized or harmed by those around me;" 4) infection of a vulnerable family member: "I am worried that health vulnerable people (elderly, children, and patients) in my family will be infected with COVID-19;" and 5) economic harm due to COVID-19: "I am worried that the COVID-19 epidemic will cause economic harm to my family (including loss of jobs or difficulty in finding jobs)." We classified "strong yes" and "yes" as "yes" and "normally," "not," and "never not" as "no."

Depressive feelings and symptoms

We defined depressive feelings as a yes response to the question, "In the last year, have you felt sadness or desperation for more than two weeks?"

We assessed depressive symptoms based on the Patient Health Questionnaire-9 (PHQ-9), which has a 94% specificity and 88% sensitivity for detecting major depression.[22,23] The PHQ-9 comprises nine questions including, "little interest or pleasure in doing things" and "feeling down, depressed, or hopeless." The response options were as follows: 0=not at all, 1=several days, 2=more than half a day, and 3=nearly every day. The total scores ranged from 0 to 27, with higher scores indicating greater self-reported depressive symptoms. We defined a total score ≥10 as having depressive symptoms.

Statistical analysis

We analyzed the data using chi-square tests and multiple logistic regression analyses and performed statistical analysis using SAS software (version 9.4; SAS Institute, Cary, NC, USA). To examine differences in depressive feelings and depressive symptoms (PHQ-9), we used chi-square tests based on general and COVID-19−related characteristics, following the PROC FREQ procedure. We performed multiple logistic regression analysis to determine the odds ratios and 95% confidence intervals (CIs), following the PROC SURVEY procedure. All analyses used weighted variables, with a p-value< 0.05, indicating statistical significance.

RESULTS

Of the respondents, 5.9% experienced depressive feelings and 2.9% had depressive symptoms. The rates of depressive feelings were 4.4%, 7.4%, and 6.0% among men, women, and those aged 19−44 years, respectively; the rates were 6.5%, 7.2%, 7.9%, and 13.4% among those with hypertension, diabetes, quarantine or hospitalization due to COVID-19, and respiratory symptoms such as fever or cough, respectively. The rate of depressive symptoms was 2.0% in men and 3.7% in women. According to household income, the rate was highest among those earning <100 times ten thousand won per month, at 7.0%, and 1.7% among those earning ≥500 times ten thousand won per month. The rates of depressive symptoms among those with hypertension and diabetes were 3.6% and 4.4%, respectively. These rates were 3.0% and 9.9%, respectively, among those who experienced quarantine or hospitalization due to COVID-19 and those who experienced respiratory symptoms, such as fever or cough (Table 1).

The rate of depressive feeling was significantly higher among the respondents who were concerned about COVID-19 infection (6.3% vs. 5.1%, p<0.001), those who were concerned about

death due to COVID-19 (7.0% vs. 5.2%, p<0.001), those who were concerned about criticism from surrounding people (6.0% vs. 5.5%, p<0.001), those who were concerned about infection of vulnerable people (6.1% vs. 5.0%, p<0.001), and those who were concerned about economic harm (6.2% vs. 4.8%, p<0.001). Similarly, depressive symptoms were significantly higher among the respondents who were concerned about COVID-19 infection (3.1% vs. 2.5%, p<0.001), those who were concerned about death due to COVID-19 (3.6% vs. 2.5%, p<0.001), those who were concerned about the infection of vulnerable people (3.0% vs. 2.3%, p<0.001), and those who were concerned about economic harm (3.1% vs. 2.1%, p<0.001) (Table 2).

The adjusted odds ratios (aORs) for depressive feeling were significantly higher for women (aOR=2.36, 95% CI=2.19−2.54), adults aged 19 to 44 years (aOR=1.99, 95% CI=1.82−2.17), adults with low household incomes (aOR=2.67, 95% CI=2.44−2.92), those who had experienced COVID-19 related symptoms (aOR=1.97, 95% CI=1.69−2.31), those who were concerned about death due to COVID-19 (aOR=1.19, 95% CI=1.12−1.26), and those who were concerned about economic harm due to COVID-19 (aOR=1.13, 95% CI=1.05−1.22). We obtained similar results for depressive symptoms based on the PHQ-9: women (aOR=2.78, 95% CI=2.49−3.10), adults aged 19 to 44 years (aOR=2.16, 95% CI=1.95−2.41), adults with low household incomes (aOR=3.59, 95% CI=3.18−4.05), those who had experienced COVID-19 related symptoms (aOR=2.70, 95% CI=2.24−3.24), those with concerns about death due to COVID-19 (aOR=1.18, 95% CI=1.09−1.28), and those with concerns about economic harm due to COVID-19 (aOR=1.30, 95% CI=1.17−1.44) (Table 3).

DISCUSSION

We investigated the rate of depression and its related factors among Korean adults during the COVID-19 pandemic. The results showed that the rate of depressive feelings was 5.9% in 2020, while the rate of depressive symptoms based on the PHQ-9 was 2.9%. Meanwhile, 68.5% of the respondents said they were worried about being infected with COVID-19, and 75.9% said they were worried about the economic harm caused by COVID-19.

Our study had several points of interest. First, based on the KCHS, the rate of depressive feelings increased slightly from 5.5% in 2019 to 5.9% in 2020. However, previous studies reported a substantially higher prevalence of depression. According to the Korea National Health and Nutrition Examination Survey, the prevalence of depression before COVID-19 was 6.7%;[24] following the outbreak of COVID-19, Korean studies reported a prevalence of depression of 17.5%.[19] Overall,

Table 1. General characteristics and depression in Korean adults

	Total N (weighted %)	Depressive feeling		Depressive symptoms	
		N (weighted %)	χ² (p-value)	N (weighted %)	χ² (p-value)
Total	229,236	12,839 (5.9)		6,436 (2.9)	
Gender			559.7 (<0.001)		341.5 (<0.001)
Men	103,883 (49.5)	4,184 (4.4)		2,016 (2.0)	
Women	125,353 (50.4)	8,655 (7.4)		4,420 (3.7)	
Age (yr)			1.9 (0.370)		189.9 (<0.001)
19−44	67,699 (41.7)	3,938 (6.0)		2,036 (3.1)	
45−64	88,749 (38.4)	4,945 (5.9)		1,865 (2.2)	
≥65	72,788 (19.7)	3,956 (5.8)		2,535 (3.7)	
Household income (10,000 won/mon)			739.5 (<0.001)		975.6 (<0.001)
≤99	36,845 (9.3)	3,147 (10.5)		2,015 (7.0)	
100−299	71,469 (26.3)	4,330 (7.1)		2,097 (3.5)	
300−499	55,873 (27.7)	2,664 (5.2)		1,219 (2.5)	
≥500	63,068 (36.6)	2,561 (4.4)		1,051 (1.7)	
Residence			3.3 (0.066)		0.1 (0.956)
Urban	68,376 (44.6)	4,169 (6.0)		2,051 (2.9)	
Rural	160,860 (55.3)	8,670 (5.8)		4,385 (2.9)	
Household generation			58.3 (<0.001)		83.7 (<0.001)
1st	109,008 (35.7)	6,495 (6.6)		3,396 (3.5)	
2nd	105,084 (57.2)	5,628 (5.6)		2,628 (2.5)	
3rd	15,131 (6.9)	716 (5.2)		412 (2.9)	
Alcohol drinking			57.6 (<0.001)		112.1 (<0.001)
Never	55,862 (18.3)	3,093 (5.8)		1,732 (3.0)	
<1 per year	41,026 (15.7)	2,729 (7.0)		1,529 (3.8)	
1−4 per month	91,317 (46.8)	4,805 (5.6)		2,102 (2.5)	
≥2 per week	41,013 (19.1)	2,212 (5.9)		1,073 (3.0)	
Smoking status			68.0 (<0.001)		76.3 (<0.001)
Never	149,916 (63.2)	8,515 (5.8)		4,152 (2.7)	
Former	41,895 (18.5)	1,995 (5.2)		1,021 (2.5)	
Current	37,400 (18.1)	2,328 (6.9)		1,263 (3.7)	
Self-rated health			1,307.7 (<0.001)		1,751.5 (<0.001)
Good	109,960 (52.7)	3,672 (3.6)		1,028 (1.0)	
Poor	119,268 (47.2)	9,166 (8.4)		5,408 (5.0)	
Hypertension			27.3 (<0.001)		80.5 (<0.001)
Yes	64,008 (21.0)	3,841 (6.5)		2,217 (3.6)	
No	165,202 (78.9)	8,995 (5.7)		4,217 (2.7)	
Diabetes mellitus			46.5 (<0.001)		126.8 (<0.001)
Yes	26,833 (9.03)	1,797 (7.2)		1,119 (4.4)	
No	202,379 (90.9)	11,040 (5.8)		5,315 (2.7)	
Quarantine or hospitalization experience due to COVID-19			5.9 (0.014)		0.1 (0.801)
Yes	1,073 (0.6)	88 (7.9)		34 (3.0)	
No	228,163 (99.3)	12,751 (5.9)		6,402 (2.9)	
Previously experienced COVID-19 related symptom			167.0 (<0.001)		275.2 (<0.001)
Yes	2,648 (1.3)	3,28 (13.4)		249 (9.9)	
No	226,588 (98.6)	12,511 (5.8)		6,187 (2.8)	

Table 2. COVID-19 infection related concerns and depression

COVID-19 infection related concerns	Total N (%)	Depressive feeling		Depressive symptoms	
		N (weighted %)	χ² (p-value)	N (weighted %)	χ² (p-value)
COVID-19 infection (N=229,174)			60.0 (<0.001)		35.7 (<0.001)
Yes	161,705 (68.5)	9,452 (6.3)		4,756 (3.1)	
No	67,469 (31.4)	3,382 (5.1)		1,674 (2.5)	
Death due to COVID-19 (N=229,049)			160.2 (<0.001)		130.4 (<0.001)
Yes	103,180 (38.7)	6,456 (7.0)		3,355 (3.6)	
No	125,869 (61.2)	6,369 (5.2)		3,073 (2.5)	
Criticism from surrounding people due to COVID-19 infection (N=228,981)			11.5 (<0.001)		5.2 (0.022)
Yes	173,394 (72.5)	9,810 (6.0)		4,885 (3.0)	
No	55,587 (27.4)	3,009 (5.5)		1,537 (2.7)	
Infection of a vulnerable family member (N=211,926)			37.1 (<0.001)		32.9 (<0.001)
Yes	182,805 (84.6)	10,537 (6.1)		5,286 (3.0)	
No	29,121 (15.3)	1,433 (5.0)		693 (2.3)	
Economic harm due to COVID-19 (N=229,122)			83.4 (<0.001)		85.5 (<0.001)
Yes	180,065 (75.9)	10,491 (6.2)		5,301 (3.1)	
No	49,057 (24.0)	2,337 (4.8)		1,126 (2.1)	

the prevalence of depression increased following COVID-19, although the current study reports a relatively lower rate. According to a previous study,[25] the government's strict measures to control the spread of COVID-19 are related to depression. During the 2020 KCHS survey period, the number of coronavirus cases was low, ranging from 100 to 120 per day, while the Korean government's response to COVID-19 was agile and comprehensive, including testing to identify cases, contact tracing, and treatment systems, with low and stable mortality.[26] Therefore, the KCDC's and Korean government's control policies for COVID-19 were well-evaluated during the KCHS period. This finding may be related to the lower prevalence observed in the present study. Furthermore, unlike other surveys conducted online, people with higher levels of depression might not have participated in the survey because the KCHS was conducted face-to-face.

Second, an increase in the prevalence of depression during the COVID-19 outbreak has been reported in other countries. For example, the prevalence of depression in the United States was 8.7% in 2017−2018, which increased significantly to 14.4% during the COVID-19 pandemic in 2020.[27] During the COVID-19 pandemic in China, stress was the most prevalent (48.1%) mental health consequence of the COVID-19 pandemic, followed by depression (26.9%) and anxiety (21.8%).[28] In Japan, the prevalence of depression before COVID-19 was 8%,[29] which rose during the COVID-19 pandemic to 18.4%.[30] Therefore, COVID-19 was associated with an increased prevalence of depression globally. However, compared with other countries, our results showed a relatively low prevalence of

depression. This might be because the 2020 KCHS was conducted in the early phase of the COVID-19 outbreak when there was a relatively small number of new cases and good infection control. In addition, since the KCHS was conducted face-to-face, those with relatively little anxiety or depression due to COVID-19 might have participated.

Third, concerns about COVID-19 had a significant impact on depressive feelings and symptoms in this study. Overall, the participants had high levels of concern about COVID-19 that were associated with various directed stressors such as fear of infection, financial burden, and social isolation, which could increase the risk of mental illness and suicidal behavior.[31] Among the types of concerns, economic harm due to COVID-19 was significantly associated with both depressive feelings and symptoms. Unexpectedly, new emerging diseases have had a considerable impact on people's daily and economic lives, including on unemployment and reduced salaries.[18] COVID-19 infection can have various consequences, from minor health changes to death. The death of surrounding people, such as family members, colleagues, or friends,[32] and easily accessible information on the mortality of people infected with COVID-19 could aggravate mental health conditions by creating fear of death. Therefore, it is necessary to understand not only the direct economic harm caused by COVID-19 but also the potential health impacts, including identifying high-risk groups and the extent of the impact.

Fourth, various general factors were associated with depressive feelings and symptoms. In our study, women were more likely to have depression than men. These results were consis-

Table 3. Related factors with depression in Korean adults

	Depressive feeling	Depressive symptoms
	OR (95% CI)	OR (95% CI)
Gender (/men)		
Women	2.36 (2.19–2.54)	2.78 (2.49–3.10)
Age (/≥65 years)		
19–44	1.99 (1.82–2.17)	2.16 (1.95–2.41)
45–64	1.60 (1.49–1.72)	1.06 (0.96–1.17)
Household income (/≥500+ ten thousand won/month)		
<100	2.67 (2.44–2.92)	3.59 (3.18–4.05)
100–299	1.65 (1.53–1.77)	1.85 (1.66–2.05)
300–499	1.17 (1.08–1.26)	1.28 (1.15–1.42)
Residence (/rural)		
Urban	1.10 (1.04–1.16)	1.09 (1.01–1.16)
Household generation (/3rd)		
1st	0.99 (0.88–1.11)	0.79 (0.68–0.91)
2nd	1.02 (0.91–1.14)	0.84 (0.73–0.97)
Alcohol drinking (/never)		
<1 per year	1.21 (1.12–1.30)	1.27 (1.15–1.40)
1–4 per month	1.10 (1.03–1.19)	1.05 (0.94–1.16)
≥2 per week	1.22 (1.12–1.34)	1.26 (1.12–1.42)
Smoking status (/never)		
Former	1.53 (1.40–1.67)	1.79 (1.58–2.01)
Current	1.97 (1.80–2.15)	2.53 (2.24–2.84)
Self-rated health (/good)		
Poor	2.16 (2.05–2.28)	4.17 (3.82–4.56)
Hypertension (/no)		
Yes	1.04 (0.98–1.11)	1.08 (0.99–1.17)
Diabetes mellitus (/no)		
Yes	1.07 (0.99–1.15)	1.21 (1.10–1.34)
Quarantine or hospitalization experience due to COVID-19 (/no)		
Yes	1.44 (1.09–1.90)	1.10 (0.70–1.72)
Previously experienced COVID-19 related symptom (/no)		
Yes	1.97 (1.69–2.31)	2.70 (2.24–3.24)
COVID-19 infection related concerns (/no)		
COVID-19 infection	1.03 (0.97–1.11)	0.96 (0.88–1.05)
Death due to COVID-19	1.19 (1.12–1.26)	1.18 (1.09–1.28)
Criticism from surrounding people due to COVID-19	0.95 (0.89–1.01)	0.95 (0.86–1.05)
Infection of a family member	1.03 (0.94–1.12)	1.04 (0.92–1.17)
Economic harm due to COVID-19	1.13 (1.05–1.22)	1.30 (1.17–1.44)

OR, odds ratio; CI, confidence interval

tent with those of previous studies that reported higher scores for stress, anxiety, and depression in women than in men.[31] COVID-19 has caused substantial changes in family life, including telecommuting and online learning of children at home, and women might be more vulnerable to stress due to these life changes. People over the age of 65 have a lower risk of depression than those aged 19–44, consistent with a previous study.[31] Because older people tend to be less socially active than younger people, stress and depression from quarantine measures such as social distancing would be lower than in younger people. Younger age groups might perceive their academic, occupational, and economic prospects to be more threatened by COVID-19 than older adults, resulting in increased stress and depression.[33] Urban residents tended to be more depressed compared to rural residents, which might be because of the rapid spread of COVID-19 infection in cities due to their relatively high population density.[34] Household generation was also associated with depressive symptoms. Since time with family has increased due to sudden physical and social isolation due to COVID-19, family structure, such as household generation, number of family members, and whether or not they live together, would affect mental health.

Fifth, among the health-related factors, alcohol consumption and smoking were associated with depressive feelings and symptoms. People with poor mental health were more likely to engage in unhealthy behaviors such as smoking or drinking alcohol to relieve their symptoms temporarily.[35] Those who rated poor health or had a diagnosis history of diabetes were more likely to have depressive feelings or symptoms. Chronic diseases such as diabetes are known risk factors for both depression and COVID-19 infection.[36] Experience of quarantine or hospitalization due to COVID-19 were associated with depressive feelings. Although the KCHS did not collect clinical information on COVID-19, such as quarantine duration, location, and disease severity, sudden separation from family and society and strict limitations in daily life could cause depression. Although the prevalence of unhealthy behaviors, such as smoking and alcohol drinking, has decreased since the COVID-19 outbreak, a substantial proportion of the population has continued to engage in unhealthy behaviors.[37] Furthermore, people with chronic diseases have suffered not only from their existing diseases but also from their vulnerability to new infectious diseases.[38] Therefore, traditional risk factors and high-risk groups, as well as newly identified populations and risk factors, require regular monitoring and management during the pandemic.

This study has some limitations. First, due to the cross-sectional nature of the KCHS, we could not examine the temporal relationship between depression and its associated factors. For example, there may be a bidirectional association between

COVID-19 infection-related concerns and depression. Second, we conducted the 2020 KCHS through a one-to-one face-to-face investigation during the COVID-19 pandemic. Although the interviewers and participants followed personal hygiene rules, such as hand disinfection, mask-wearing, and social distancing, people who were highly concerned about COVID-19 infection might have been prevented from participating in the survey. Third, we collected all KCHS data using a self-reported measure and did not confirm the disease and COVID-19 infection histories by other measures. Fourth, we found some differences in related factors, although most were similar for depressive feelings and symptoms. Both depressive feelings and symptoms are tools used to screen for depression in the community; however, the reference period for depression-related conditions differs. Moreover, they might not reflect specific situations, such as the impact on the mental health of the infection control policy or sudden restrictions on daily life.

In conclusion, during the COVID-19 outbreak in Korea, the rates of depressive feelings and symptoms were 5.9% and 2.9%, respectively. People's concerns about infection, death, surrounding criticism, infection of the health vulnerable, and economic harm were related to depression. This suggests that COVID-19 significantly affects mental health. We believe that this study will provide guidance on timely and effective government interventions for mental health in the event of an infectious disease in the future.

Availability of Data and Material

The datasets analyzed during the current study are available in the Korea Community Health Survey website (https://chs.kdca.go.kr/chs/index.do).

Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

Author Contributions

Conceptualization: Seo-Hee Kim, Mi Ah Han. Formal analysis: Seo-Hee Kim. Funding acquisition: Mi Ah Han. Investigation: Seo-Hee Kim, Mi Ah Han. Methodology: Mi Ah Han. Project administration: Seo-Hee Kim, Mi Ah Han. Supervision: Seo-Hee Kim, Mi Ah Han. Writing—original draft: Seo-Hee Kim. Writing—review & editing: Seo-Hee Kim, Mi Ah Han.

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