RESEARCH ARTICLE

Suicidal ideation and attempted suicide among cancer patients during the COVID-19 pandemic

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Abstract

This study aimed to understand the suicidal ideation and suicidal attempts among cancer patients during the COVID-19 pandemic. The data were collected from patients diagnosed with cancer while attending the largest cancer center in the south of China. A structured questionnaire was used to investigate patients' demographic data, suicidal behavior, and factors related to COVID-19. Mental health conditions were measured by the Generalized Anxiety Disorder-7, the Patient Health Questionnaire-9, and the Brief Symptom Inventory. Comorbidities and medical conditions of cancer patients were extracted from the electronic healthcare records. Among the 5670 cancer patients, 755 (13.3%) reported suicidal ideation, and 266 (4.7%) reported suicidal attempts during the COVID-19 pandemic. The age group with the highest risk of suicidal ideation was 20–24 years (23.9%). Lifetime history of suffering from mental disorders, longer time since cancer diagnosis, regional and distant tumor stage, depression, anxiety, hostility, having a higher frequency of worrying about cancer management due to COVID-19, higher frequency feeling of overwhelming psychological pressure due to COVID-19, having a higher level of barriers to manage cancer due to COVID-19, and higher barriers to continue treatment of cancer due to inconveniences caused by COVID-19, were all significantly associated with increased risk of suicidal ideation. We also identified the risk factors of suicide attempts. This is the first study investigating the prevalence and

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risk factors associated with suicidal ideation and suicidal attempts in Chinese cancer patients during the COVID-19 pandemic. Our findings suggest that it is essential to monitor the mental health conditions of this vulnerable population, especially for cancer patients who have comorbidity with a history of mental disorders. Also, government policymakers should take action to protect cancer patients to avoid any interruption of their continued treatment. Further efforts are urgently required to develop specific psychological interventions to reduce the risk factors among cancer patients during the COVID-19 pandemic.

1 | INTRODUCTION

Cancer is one of the leading causes of mortality in China, with the prevalence of cancer continuing to increase in recent years.[1] Cancer patients suffer from both physical and psychological challenges.[1] Psychological challenges include an increased likelihood of having a mental health disorder when compared with the general population. In relation to the higher prevalence of mental disorders, there is also a higher suicidal risk in cancer patients.[2–5] For example, a UK survey (n = 2924) found that 7.8% of cancer patients reported being better off dead, thoughts of hurting themselves, and emotional distress, which were significantly associated with a high risk of suicidal thoughts.[6] Previous research in the United States also found that patients with cancer had almost twice of suicide incidence compared to the general population.[7] According to a large cohort study in a Swedish population, when compared with individuals without a cancer diagnosis, patients who recently received a cancer diagnosis had an increased risk of suicide.[5] Cohort research in Norway further showed that cancer was a risk factor for suicide, especially after a recent diagnosis.[8] Literature review also documented that the suicide incidence in people with a cancer diagnosis was almost doubled when compared with that in the general population. Patients who were males, at an older age (65 years old and above), with specific cancer diagnoses (including prostate, lung, pancreatic, and head and neck cancers) were more likely to have suicidal attempts. Besides those mentioned risk factors, various factors increased the likelihood of suicide in cancer patients, such as physical symptoms, psychological distress, and existential sufferings.[9]

Some cancers can be defined as long-term condition with advances in cancer treatment. The mental health problems in cancer patients, such as suicidal ideation, have led to detrimental consequences including decreased cancer survival, lower treatment adherence, and increased treatment costs.[10] Moreover, the impact of suicide can also affect family members, friends, and healthcare professionals who are caring for cancer patients.[11] It is important to note the barriers for oncologists, nurses, and social workers in identifying suicide risk in cancer patients, such as lack of training and awareness, lack of human resources, worries about asking about suicidality, and lack of appropriate coping resources for suicidal patients.[12,13]

The COVID-19 pandemic has accelerated globally, however, the impact of the pandemic on different underlying health conditions is still unknown.[14] Previous research has shown that the suicidal ideation of cancer patients was significantly associated with depression.[15] For cancer patients, it is likely that the COVID-19 pandemic might cause mood disturbances to cancer patients. Consequently, it is likely to observe an increase in suicidal ideation and suicidal attempts in cancer patients during the COVID-19 pandemic period.

Identifying the risk factors of suicidality in clinical oncology is essential for the early detection of suicidal patients. This study aimed to investigate the risk factors associated with suicidal ideation and suicidal attempts in cancer patients during the COVID-19 pandemic by comprehensively considering sociodemographic factors, mental health status, cancer condition characteristics, and specific COVID-19 affected conditions.

2 | METHODS

2.1 | Participants

This was a cross-sectional study using cluster sampling to recruit patients with cancer from Sun Yat-sen University Cancer Center between the 9th and the 16th of April 2020. Sun Yat-sen University Cancer Center is the largest cancer center in the south of China and the third largest radiotherapy center in the world. In 2019, the number of outpatients, inpatients, and inpatient operations conducted in the center was approximately 1.2 million, 130 000, and 56 000, respectively. In addition, the center completed the largest number of radiotherapies in the world totaling approximately 12 500 per year. All patients were diagnosed with a malignant tumor (International Statistical Classification of Diseases, 10th Revision [ICD-10] codes C00-C97). Combining the World Health Organization (WHO) classification of tumors and tumor sites, we divided all the primary tumors into 12 types. Potential participants were invited by being sent a short mobile message to the cell phone number reserved in our information system describing the study, including a hyperlink to the survey website. All patients were required to provide their medical record case number to confirm their medical status. The study protocol

adhered to the regulations of the Declaration of Helsinki (as revised in Edinburgh 2000) and the Institutional Review Board of Sun Yat-Sen University Cancer Center approved this study.

2.2 | Outcome measures

The survey included self-reported sociodemographic information that included sex, age, school education level, history of mental disorder (diagnosed by a psychiatrist), annual family income, residence location, marital status, and employment status. Comorbidities and medical conditions of cancer patients were extracted from their electronic healthcare records. The perception of factors related to COVID-19-affected conditions consisted of five items. The first was the frequency of worrying about cancer management due to COVID-19, the second was the frequency of receiving information and news related to COVID-19, and the third was the frequency of feeling an overwhelming psychological pressure due to COVID-19. These three items were measured on a scale from 1 (never) to 5 (always). The fourth item consisted of the barriers to manage cancer conditions, and the fifth item measured the barriers to accessing treatment due to the pandemic of COVID-19. These two items were measured based on the impact degrees from 1 (not at all) to 5 (very often). Suicidal behaviors were assessed using the following dedicated items, which had been widely used in previous cancer studies.[16,17] Suicidal ideation was measured using the following item: "Have you ever thought about killing yourself during (since Wuhan city closed down in January 23, 2020) the COVID-19 pandemic?" The response options were provided on a 4-point Likert scale ranging from "not at all" to "extremely (nearly every day)." Participants who reported that they have ever had thoughts of ending their life were classified as having suicidal ideation. Suicide attempts were measured using the following item: "Have you attempted suicide during the pandemic (since Wuhan city closed down in January 23, 2020)?" The response options were (1) no; (2) yes. Participants who reported that they had attempted suicide (option 2) were classified as having a suicidal attempt. Anxiety, depression, and hostility were assessed by the validated Chinese version of the Generalized Anxiety Disorder-7 (GAD-7),[18] the Patient Health Questionnaire-9 (PHQ-9),[19] and the Brief Symptom Inventory (BSI),[20] respectively. GAD-7 consists of seven items, and the rating range of each item is 0–3, with a total score from 0 to 21. PHQ-9 consists of nine-item measures and the rating range of each item is from 0 to 3 with a total score from 0 to 27. Five items from the BIS were used and each item was rated from 0 (not at all) to 4 (extremely), with a total score from 0 to 20. A higher total score indicated a higher risk of depression, anxiety, and hostility.

2.3 | Statistical analysis

Participant characteristics were presented as mean (SD) for continuous variables and as a percentage (%) for categorical variables. Descriptive analysis was used to summarize the characteristics of the study's participants. The crude rates of suicidality were calculated using the number of participants with suicidal ideation and attempts and the corresponding patients' electronic health record. Age-stratified rates were estimated by using the following formula: [The percentage of suicide ideations = (the number of people in different age groups who have suicidal ideation/the total number of people in each age group who participated in the survey) × 100%]; χ^2 and t-test were used to compare the characteristics of the participants with and without suicidal ideation and the significant characteristics were further entered into logistic regression. Hierarchical logistic regression models were used to estimate odds ratios (ORs) with a 95% confidence interval (CI) for the associations between sociodemographic characteristics, mental health, factors related to COVID-19, and suicidal ideation and suicide attempt. Analyses were performed using the SPSS package, Version 20.0 (IBM).

3 | RESULTS

We initially sent messages to 8649 patients who attended the cancer center and a total of 5977 completed the questionnaires, resulting in a response rate of 69.1%. Finally, patients aged lower than 16 years old ($n = 115$) and undiagnosed patients ($n = 192$) were excluded, leaving 5670 patients diagnosed with cancer in the final sample.

The characteristics of the sample are shown in Table 1. Among 5670 patients, the participants had an average age of 50.48 (SD 13.21) years. There were 2978 (52.5%) men and 2244 (39.6%) had college or higher education. Most participants ($n = 3927$ [69.3%]) were living in an urban setting during the past 3 months, 4989 (88.0%) were married, 3831 (67.6%) were employed, and 1106 (19.5%) had an annual family income of 150 000 RMB or above. Of all participants, 1732 (30.5%) received radiotherapy and 3446 (60.8%) received chemotherapy (including biotherapy, targeted therapy, stem cell transplantation, etc.). Besides, 1136 (20.0%) were at the stage of localize tumor and 2008 (35.4%) were regional. Furthermore, 673 (11.9%) were diagnosed with cancer between 1 and 3 months, 1490 (26.3%) were first diagnosed with cancer between 1 and 3 years ago, and 1051 (18.5%) were diagnosed with cancer more than 3 years ago.

There were 133 (2.3%) who reported a lifetime history of mental disorders, 755 (13.3%) reported suicidal ideation, and 266 (4.7%) reported suicidal attempts. Participants in the age group 35–54 were found to have a higher number of people reporting suicidal ideation (Figure 1). However, younger patients were found to have the highest risk of suicidal ideation by using standardized age. The age group that had the highest risk of suicidal ideation was 20–24 (23.9%), followed by 30–34 (19.5%) and 25–29 (18.6%) years. Patients with unknown primary cancer reported the highest risk of suicide ideation (25%), followed by cancer of the female genital system (19.6%) and nervous system (17.2%). Among cancer patients who had suicide ideation, 51 (6.7%) had a history of mental disorders. Among those who reported suicidal attempts, 19 (7.1%) had a history of mental disorders.

The results of logistic regression models of suicidal ideation are shown in Table 2. The mental health factors associated with a higher

TABLE 1 Demographic and clinical characteristics of the cancer patients (N = 5670)

Variables	Total	Cancer patients with suicidal ideation	Cancer patients without suicidal ideation	t/χ^2 (p)
	n (%)	n (%)	n (%)	
Total	5670 (100)	755 (13.3)	4915 (86.7)	
Sex				27.95 (**<0.001**)
Male	2978 (52.5)	329 (43.6)	2649 (53.9)	
Female	2692 (47.5)	426 (56.4)	2266 (46.1)	
Educational level				0.11 (0.74)
High school or below	3426 (60.4)	452 (59.9)	2974 (60.5)	
College or above	2244 (39.6)	303 (40.1)	1941 (39.5)	
Annual family income				4.40 (**0.04**)
<150 000	4564 (80.5)	629 (83.3)	3935 (80.1)	
≥150 000	1106 (19.5)	126 (16.7)	980 (19.9)	
Residence				0.36 (0.55)
Rural	1743 (30.7)	225 (29.8)	1518 (30.9)	
Urban	3927 (69.3)	530 (70.2)	3397 (69.1)	
Marital status				28.40 (**<0.001**)
Married	4989 (88.0)	620 (82.1)	4369 (88.9)	
Unmarried/others	681 (12.0)	135 (17.9)	546 (11.1)	
Employment status				12.96 (**<0.001**)
No	1839 (32.4)	288 (38.1)	1551 (31.6)	
Yes	3831 (67.6)	467 (61.9)	3364 (68.4)	
History of mental disorder				73.92 (**<0.001**)
No	5537 (97.7)	704 (93.2)	4833 (98.3)	
Yes	133 (2.3)	51 (6.8)	82 (1.7)	
Time since diagnosis				20.18 (**0.003**)
1–4 weeks ago	445 (7.8)	40 (5.3)	405 (8.2)	
1–3 months ago	673 (11.9)	107 (14.2)	566 (11.5)	
3–6 months ago	980 (17.3)	157 (20.8)	823 (16.7)	
6–12 months ago	1031 (18.2)	131 (17.4)	900 (18.3)	
1–3 years ago	1490 (26.3)	178 (23.6)	1312 (26.7)	
3–5 years ago	544 (9.6)	75 (9.9)	469 (9.5)	
More than 5 years	507 (8.9)	67 (8.9)	440 (9.0)	
Tumor stage				39.65 (**<0.001**)
Localized	1136 (20.0)	90 (11.9)	1046 (21.3)	
Regional	2008 (35.4)	276 (36.6)	1732 (35.2)	
Distant	1922 (33.9)	288 (38.1)	1634 (33.2)	
Unstaged/unknown	604 (10.7)	101 (13.4)	503 (10.2)	
	M ± SD	M ± SD	M ± SD	
Age (years)	50.48 ± 13.21	48.41 ± 13.79	50.98 ± 12.87	5.07 (**<0.001**)

TABLE 1 (Continued)

Variables	Total	Cancer patients with suicidal ideation	Cancer patients without suicidal ideation	t/χ^2 (p)
Anxiety (GAD-7)	2.94 ± 4.30	8.22 ± 5.67	2.13 ± 3.39	−41.28 (**<0.001**)
Depression (PHQ-9)	3.97 ± 4.85	9.90 ± 6.17	3.06 ± 3.89	−41.03 (**<0.001**)
Hostility (BSI)	6.75 ± 2.80	9.45 ± 4.11	6.34 ± 2.27	−30.63 (**<0.001**)

Note: Bold values means statistically significant.

Abbreviations: BSI, Brief Symptom Inventory; GAD-7, Generalized Anxiety Disorder-7; PHQ-9, the Patient Health Questionnaire-9.
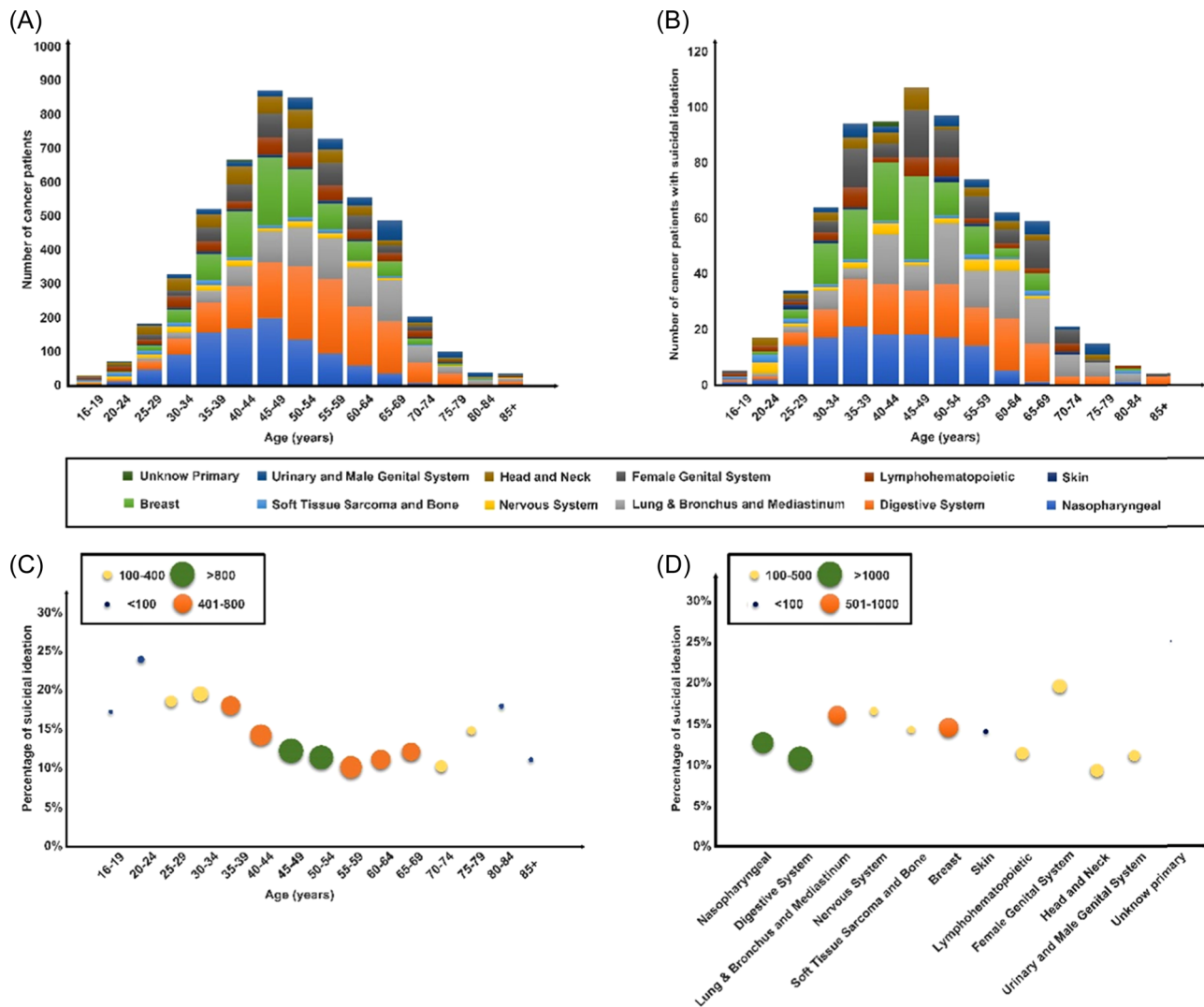

FIGURE 1 Clinical characteristic of our patients and its distribution with suicide ideation. (A) The *y*-axis depicts the absolute number of total patients (*n* = 5670) and the *x*-axis depicts the age group. Different colors depict various primary tumor types. (B) The *y*-axis depicts the absolute number of patients with suicide ideation(s) (*n* = 757) and the *x*-axis depicts the age groups. Different colors depict various primary tumor types. (C) The distribution of the percentage of suicide ideation with different age groups. The percentage of suicide ideation = (the number of people in different age groups who have suicidal ideations/the total number of people in each age group who participated in the survey) × 100%. (D) The distribution of the percentage of suicide ideation with different primary tumor types. The percentage of suicide ideation = (the number of people with different tumor types who have suicidal ideations/the total number of people with different tumor types who participated in the survey) × 100%.

TABLE 2 The association between suicidal ideation and related risk factors in the whole sample (N = 5670)

Variables	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)
Sociodemographics and clinical characteristics			
Age	**0.99 (0.98, 0.996)**	**0.99 (0.98, 0.998)**	**0.99 (0.98, 0.997)**
Sex (Men)	**0.71 (0.60, 0.83)**	**0.72 (0.60, 0.87)**	**0.72 (0.59, 0.87)**
Annual family income (≥150 000)	0.83 (0.67, 1.03)	0.97 (0.76, 1.24)	1.11 (0.85, 1.43)
Marital status (Married)	**0.69 (0.55, 0.86)**	**0.74 (0.57, 0.96)**	**0.66 (0.50, 0.87)**
Employment status (Yes)	**0.82 (0.69, 0.97)**	1.14 (0.93, 1.39)	1.13 (0.91, 1.40)
History of mental disorder (Yes)	**4.44 (3.07, 6.42)**	**1.62 (1.04, 2.52)**	**1.76 (1.09, 2.82)**
Time since diagnosis (1–4 weeks ago as ref)			
1–3 months ago	**1.97 (1.33, 2.92)**	**2.07 (1.30, 3.29)**	1.56 (0.96, 2.53)
3–6 months ago	**1.98 (1.35, 2.90)**	**2.18 (1.39, 3.41)**	**1.68 (1.05, 2.68)**
6–12 months ago	1.47 (0.995, 2.18)	**1.71 (1.08, 2.70)**	1.44 (0.89, 2.32)
1–3 years ago	1.32 (0.90, 1.93)	**1.70 (1.09, 2.65)**	1.43 (0.90, 2.28)
3–5 years ago	**1.65 (1.07, 2.53)**	**2.50 (1.52, 4.09)**	**2.28 (1.35, 3.83)**
More than 5 years	**1.62 (1.05, 2.50)**	**2.14 (1.28,3.56)**	**1.78 (1.04, 3.06)**
Tumor stage (localized as ref)			
Regional		**1.46 (1.09, 1.95)**	**1.46 (1.06, 1.99)**
Distant		**1.82 (1.36, 2.44)**	**1.72 (1.26, 2.35)**
Unstaged/unknown		**1.59 (1.10, 2.30)**	1.40 (0.95, 2.07)
Mental health status			
Anxiety (GAD-7)		**1.12 (1.09, 1.16)**	**1.06 (1.03, 1.10)**
Depression (PHQ-9)		**1.15 (1.12, 1.18)**	**1.13 (1.09, 1.16)**
Hostility (BSI)		**1.07 (1.04, 1.11)**	**1.06 (1.02, 1.10)**
COVID-19 related risks			
Frequency of receiving COVID-19 information and news (any sources)			0.97 (0.87, 1.07)
Barriers to manage cancer caused by COVID-19			**1.18 (1.02, 1.36)**
Barriers to continue cancer treatment caused by COVID-19			**1.74 (1.42, 2.13)**
Frequency of worrying about cancer management due to COVID-19			**1.81 (1.62, 2.02)**
Frequency feeling of overwhelming psychological pressure from COVID-19			**1.85 (1.61, 2.12)**
Nagelkerke R^2	**0.06**	**0.36**	**0.47**

Note: Bold values means statistically significant.

Abbreviations: BSI, Brief Symptom Inventory; CI, confidence interval; GAD-7, Generalized Anxiety Disorder-7; OR, odds ratio; PHQ-9, the Patient Health Questionnaire-9.

risk of suicidal ideation among cancer patients were: history of mental disorders (OR = 1.76, 95% CI = 1.09–2.82), anxiety (OR = 1.06, 95% CI = 1.03–1.10), depression (OR = 1.13, 95% CI = 1.09–1.16) and hostility (OR = 1.06, 95% CI = 1.02–1.10). A long time since cancer diagnosis and tumor stage were also found to be associated with suicidal ideation. After controlling for factors related to COVID-19 conditions, the fitness of the model was significantly improved

(R^2_{model1} = 0.06, R^2_{model2} = 0.36, R^2_{model3} = 0.47), and a higher level of barriers to manage cancer due to COVID-19 (OR = 1.18, 95% CI = 1.02–1.36), higher level of barriers to continue treatment of cancer due to inconveniences caused by COVID-19 (OR = 1.74, 95% CI = 1.42–2.13), having a higher frequency of worrying about cancer management due to COVID-19 (OR = 1.81, 95% CI = 1.62–2.02), and higher frequency of feeling overwhelming psychological pressure due

TABLE 3 The association between suicide attempts and related risk factors in the whole sample (N = 5670)

Variables	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)
Sociodemographics and clinical characteristics			
Age	**0.99 (0.98, 0.997)**	0.99 (0.98, 1.001)	0.99 (0.98, 1.01)
Sex (Men)	0.82 (0.64, 1.06)	0.89 (0.68, 1.18)	0.94 (0.71, 1.23)
Annual family income (≥150 000)	0.73 (0.51, 1.05)	0.86 (0.58, 1.25)	0.95 (0.64, 1.41)
Marital status (Married)	0.81 (0.57, 1.15)	0.99 (0.67, 1.47)	0.98 (0.65, 1.47)
Employment status (Yes)	**0.74 (0.57, 0.96)**	0.97 (0.73, 1.29)	0.97 (0.72, 1.31)
History of mental disorder (Yes)	**3.79 (2.27, 6.32)**	1.33 (0.74, 2.40)	1.27 (0.69, 2.33)
Time since diagnosis (1–4 weeks ago as ref)			
1–3 months ago	1.23 (0.70, 2.12)	1.03 (0.57, 1.86)	0.85 (0.46, 1.56)
3–6 months ago	1.08 (0.63, 1.85)	0.93 (0.52, 1.67)	0.74 (0.41, 1.34)
6–12 months ago	0.87 (0.50, 1.50)	0.84 (0.49, 1.52)	0.74 (0.41, 1.35)
1–3 years ago	0.64 (0.37, 1.10)	0.64 (0.36, 1.14)	1.43 (0.90, 2.28)
3–5 years ago	0.69 (0.36, 1.32)	0.84 (0.42, 1.67)	0.57 (0.31, 1.03)
More than 5 years	1.07 (0.58, 1.97)	1.13 (0.58, 2.18)	0.96 (0.49, 1.89)
Tumor stage (localized as ref)			
Regional	**1.56 (1.04, 2.34)**	1.29 (0.83, 2.00)	1.28 (0.82, 2.00)
Distant	**2.03 (1.37, 3.02)**	**1.71 (1.11, 2.63)**	**1.65 (1.07, 2.56)**
Unstaged/unknown	1.48 (0.88, 2.46)	0.97 (0.55, 1.68)	0.86 (0.49, 1.53)
Mental health			
Anxiety (GAD-7)		**1.06 (1.02, 1.10)**	1.01 (0.97, 1.05)
Depression (PHQ-9)		**1.12 (1.08, 1.16)**	**1.11 (1.06, 1.15)**
Hostility (BSI)		**1.11 (1.06, 1.15)**	**1.11 (1.06, 1.16)**
COVID-19 related factors			
Frequency of receiving COVID-19 information and news (any sources)			0.92 (0.80, 1.05)
Barriers to manage cancer caused by COVID-19			1.08 (0.88, 1.32)
Barriers to continue cancer treatment caused by COVID-19			**1.50 (1.12, 2.01)**
Frequency of worrying about cancer management due to COVID-19			1.15 (0.99, 1.33)
Frequency feeling of overwhelming psychological pressure from COVID-19			**1.89 (1.56, 2.28)**
Nagelkerke R^2	0.04	0.25	0.30

Note: Bold values means statistically significant.

Abbreviations: BSI, Brief Symptom Inventory; CI, confidence interval; GAD-7, Generalized Anxiety Disorder-7; OR, odds ratio; PHQ-9, the Patient Health Questionnaire-9.

to COVID-19 (OR = 1.85, 95% CI = 1.61–2.12) were found to be significantly associated with suicidal ideation. In contrast, the factors associated with lower risk of suicidal ideation among cancer patients were found to be older age (OR = 0.99, 95% CI = 0.98–0.997), men (OR = 0.72, 95% CI = 0.59–0.87), and married (OR = 0.66, 95% CI = 0.50–0.87).

In addition, the results of logistic regression models of suicidal attempts are shown in Table 3. The factors associated with a higher risk of suicidal attempts among cancer patients were at stage of distant tumor (OR = 1.65, 95% CI = 1.07–2.56), depression (OR = 1.11, 95% CI = 1.06–1.15), hostility (OR = 1.11, 95% CI = 1.06–1.16), higher level of barriers to continue treatment of cancer due to inconveniencies caused by COVID-19 (OR = 1.50, 95% CI = 1.12–2.01), and having a higher frequency feeling of overwhelming psychological pressure due to COVID-19 (OR = 1.89, 95% CI = 1.56–2.28).

4 | DISCUSSION

This is study to report the prevalence and associated factors of suicidal ideation and suicidal attempts using a large cluster sample of cancer patients during the COVID-19 pandemic. The results indicated that the factors related to the COVID-19 affected conditions were found to be significantly associated with suicidal ideation and attempted suicide. These findings may indicate that the COVID-19 pandemic is associated with increased psychological distress, an elevated risk of mental health problems, and increased suicidal behavior in cancer patients.

Surprisingly, younger patients were more likely to present suicidal tendency compared to older patients, which was contradictory to the previous findings.[6,21] This may be due to the fact that young patients had higher social and family burdens, such that once the COVID-19 pandemic was underway these burdens caused more significant financial challenges for them such as limiting work, economic opportunities, and income decreasing. On the contrary, older patients may have relatively better economic conditions when compared to younger patients.

Consistent with previous studies,[1,2] we also found that cancer patients with anxiety and depression were more likely to have suicidal ideation. Besides the mental health-related factors, conditions related with cancer, including diagnosis duration and concerns about cancer, were significantly associated with suicidal ideation. During the COVID-19 pandemic period, patients with severe COVID-19-related psychological pressure and with difficulty having cancer treatment due to inconvenience caused by COVID-19 were more likely to have suicidal ideation. The results are fundamental for the future of suicide prevention and for interventions for patients diagnosed with cancer during the Public Health Emergency of International Concern (PHEIC). Previous studies have emphasized the importance of screening for low mood in patients after the cancer diagnosis, including a risk assessment for suicidal ideations.[22] In addition, researchers have called for emergency social care services for vulnerable people to prevent health crises and overloading the healthcare system.[23] Furthermore, Calvo et al.[24] mentioned the prominence of health surveillance, including screening for mental health problems during COVID-19 to protect well-being. Importantly, our results showed that the higher barriers to manage cancer and higher barriers to continue treatment of cancer due to inconvenient transport caused by traffic control and healthcare system overloading were at risk of suicidal ideation and suicidal attempts. This result indicated that a convenient cancer treatment system needs to be established urgently to be prepared for and confront the next PHEIC in the future.

These findings enable us to draw various conclusions with relevant implications for future research and clinical practice. First, following the guidelines and recommendations for early identification and treatment of mental health problems among cancer patients, especially depression and anxiety, the governments and public health organizations should adopt effective screening tools (e.g., PHQ-9 and GAD-7 questionnaires) to detect those vulnerable population's emotional distress level. This is particularly important during the COVID-19 crisis, as self-isolating and social distancing measures have evoked more depression, anxiety, and loneliness among cancer patients. In turn, those negative feelings may exacerbate their suicide risk. Second, providing online emotion-based prevention and intervention program, including low-intensity CBT intervention[25] for patients with different levels (e.g., without, mild, severe depressive symptoms) may not only promote their mental health outcomes but also initiate a possible shield to reduce their suicide risk during this stressful time ultimately. Third, although we also recommended the screening of suicidal risks, it is important to be aware of the barriers to suicide risk management and identification in cancer patients. The common barriers for the health professional to identify at-risk patients include lack of knowledge and skill, uncomfortable feelings, and weight for professional responsibilities.[26,27] To provide effective screening, it is necessary to provide education and suicidal prevention skills for oncologists and nurses. Last but not least, with the understanding of the transmission and pathogenicity of the COVID-19 coronavirus, patients with cancer have been able to receive regular treatment in our center. A series of convenient medical solutions included online medical treatment, express delivery of medication, scheduled antitumor treatment for patients in the isolation area, and individual treatment plans for isolated patients and transfer to designated hospitals for follow-up treatment.

There are several limitations that should be acknowledged for the interpretation of the current results. First, due to the cross-sectional nature of the study, causality cannot be guaranteed. Second, the detailed protective factors were not assessed, such as the coping strategies for suicidality. Third, the sample was a subset of patients who attended the hospital for treatment. It is likely that cancer patients who gave up treatment could have a higher risk of suicidality. Fourth, this is a retrospective study, which may induce recall bias from the patients. Finally, the impacts on medication-induced side effects on suicidality were not measured. For example, high doses of corticosteroids can cause hypomania, and longer-term use of low doses can cause depression.[10]

In conclusion, the present study reports the prevalence and risk factors of suicidal ideation and suicidal attempts in patients with cancer during the COVID-19 pandemic in the year 2020. Immediate screening should be implemented by medical professionals to identify and provide support to individuals who are most at risk of suicide and suicidal attempts. Further efforts are urgently required to develop specific psychological interventions to reduce mental health problems, particularly suicidality, in patients diagnosed with cancer during COVID-19.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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