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Prevalence, correlates, and impact of depressive and anxiety disorder in cancer: Findings from a multicenter study

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ABSTRACT

Objective: Our aim was to examine the prevalence, correlates, and association of depressive and anxiety disorders with quality of life (QoL) and such other outcomes as the need for psychosocial services in cancer patients.

Method: A total of 400 patients participated in a multicenter survey involving five cancer centers located throughout Korea. The Short-Form Health Survey, the MD Anderson Symptom Inventory, the Mini-Mental Adjustment to Cancer (MINI-MAC), and Mini-International Neuropsychiatric Interview were administered.

Results: The prevalence rates for depressive and anxiety disorders were 16 and 17.1%, respectively. Younger age and poor Eastern Cooperative Oncology Group performance status, and all physical symptoms, as well as helplessness/hopelessness, anxious preoccupation (AP), and cognitive avoidance (CA) on the MINI-MAC were found to be significantly related to depressive disorder (DD) in a univariate logistic regression analysis. Metastases, the symptoms of disturbed sleep, dry mouth, and numbness or tingling, as well as AP and CAwere significantly correlated with anxiety disorder (AD) in the univariate analysis. In the multivariate analyses, only AP was significant for AD (odds ratio = 2.94, $p < 0.001$), while none reached statistical significance for DD. Psychiatric comorbidity status had a detrimental effect on various dimensions of QoL. Patients with DD or AD reported a significantly higher need for professional psychosocial services.

Significance of results: Given the substantial prevalence and pervasive impact of DD and AD on various aspects of QoL, its assessment and care should be integrated as a regular part of oncological care throughout the cancer continuum.

KEYWORDS: Cancer, Depressive disorder, Anxiety disorder, Physical symptoms, Mental adjustment to cancer, Quality of life

INTRODUCTION

Despite improved survival rates, cancer diagnosis and treatment still impose a considerable burden on patients—physical as well as mental. In fact, a

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significant proportion of cancer patients experience psychiatric comorbidity, with depression and anxiety being the most common psychiatric problems that constitute the major reasons for referrals of cancer patients to psychiatric services (Akechi et al., 2001; Grassi et al., 2000). In a metaanalysis, the prevalence of depression as defined by the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) or the *International Classification of Disease* (ICD) criteria was 16.3% and that of anxiety disorder (AD) 10.3% in oncological and hematological settings (Mitchell et al., 2011). According to National Registry data from the National Health Insurance Services, 10.4% of Koreans with newly diagnosed cancers have a comorbid psychiatric disorder after the diagnosis of cancer, and the incidence of ADs (3.37%, 18.13 cases per 1000 person-years) was highest, followed by depressive disorders (DDs) (2.45%, 13.16 cases) (Lee et al., 2015). These rates of DD and AD in cancer patients are higher than those of 1.47% found for mood disorder and 1.89% for AD in the general Korean population over the age of 20 years (Kang et al., 2014). Although these rates of DD and AD in Korean cancer patients appear to be lower than the rates reported in Mitchell et al.'s (2011) metaanalysis, where the majority of studies were done in Western countries, these rates cannot be directly compared due to different assessment methods, the former rates reflecting synthesized results from diagnostic interview-based studies and the latter reflecting the rates of diagnostic codes from insurance claims data. To the best of our knowledge, no previous studies have examined the prevalence of DD and AD in Korean patients with mixed types of cancer using structured diagnostic interview tools, which would allow for a comparison of the rates reported in Western patients to those of the Korean general population.

The detrimental impact of depression and anxiety on various patient-reported outcomes has been well-established in previous studies with cancer patients (Arrieta et al., 2013; Grabsch et al., 2006; Kissane et al., 2004; Wilson et al., 2007). For instance, depression showed a strong and negative association with quality of life (QoL) in Japanese patients with colorectal cancer (Tsunoda et al., 2005). Depression appears to affect the treatment process by reducing patients' participation in medical care (Mitchell et al., 2011) and/or lowering their compliance with treatment. In fact, the rate of poor treatment compliance among patients with no depression was 42%, while this value reached 58% among patients with depression (Arrieta et al., 2013). Psychiatric morbidity was also found to be associated with a prolonged length of hospital stay in hematological cancer patients (Prieto et al., 2002). Furthermore, a metaanalysis with 76 prospective studies showed that depression was associated with a high rate of mortality, even after controlling for disease-related confounds (Pinquart & Duberstein, 2010). Regarding AD, patients with anxiety reported a stronger wish for a hastened death (Shim & Hahm, 2011; Wilson et al., 2007), and more anxiety over difficulties with the physician–patient relationship has been observed in advanced cancer patients (Spencer et al., 2010).

Given the pervasive and serious impact of psychiatric morbidity (e.g., DD and AD), numerous studies have been carried out on its prevalence and correlates. However, research targeting East Asian populations is still relatively underrepresented in the literature, and considering the high and increasing incidence of cancer in this population, there is a strong need for more such studies.

To this end, the present study examined the prevalence; the sociodemographic, clinical, and psychological correlates (such as mental adjustment to cancer); and the association of DD and AD with QoL and such other outcomes as the use of complementary alternative medicines, treatment satisfaction, and the need for professional psychosocial services in a multicenter study involving patients with the most common-occurring types of cancer in Korea.

METHODS

Participants and Procedures

A multicenter survey was implemented at five cancer treatment hospitals (three located in Seoul and the other two in southwestern and southeastern Korea) from March to May of 2009. Cancer patients over the age of 18 years and currently on treatment or follow-up were recruited. A total of 400 patients who provided informed consent participated in the survey and were provided a small gift (worth about 8 USD). Our study was approved by the institutional review board of the National Cancer Center (no. NCCNCS-08-170).

Measures

"Psychiatric comorbidity" was determined using the Korean version of the Mini-International Neuropsychiatric Interview (K–MINI) (Sheehan et al., 1998; You et al., 2006). The measure of interrater reliability (Cohen's κ) for the K–MINI ranged from 0.22 to 0.93. Diagnoses of DD and AD were determined using the respective modules (major depressive disorders [MDDs]: major depressive episode single and recurrent; anxiety disorders: panic disorder, agoraphobia, social phobia, specific phobia, obsessive compulsive

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disorder [OCD], posttraumatic stress disorder (PTSD), and generalized anxiety disorder [GAD]). Psychiatrists, clinical psychologists, or clinical psychology graduate students supervised by psychiatrists conducted the interviews, and the interview records were checked by psychiatrists at each institution.

"Physical symptoms" were assessed by 11 physical symptom items (e.g., pain, fatigue, nausea) from the MD Anderson Symptom Inventory–Korean (MDASI–K). Participants rated the severity of each symptom on an 11-point Likert-type scale (from 0 = "not present" to 10 = "as bad as you can imagine") with reference to the previous 24 hours (Yun et al., 2006).

"Mental adjustment to cancer" was assessed via the Korean version of the MINI-Mental Adjustment to Cancer (K–MINI-MAC) (Kang et al., 2008). The 29-item MINI-MAC assesses five cognitive, emotional, and behavioral responses to a cancer diagnosis on a 4-point Likert-type scale (from 1 = "definitely does not apply to me" to 4 = "definitely applies to me"): helplessness/hopelessness (HH), anxious preoccupation (AP), cognitive avoidance (CA), fighting spirit (FS), and fatalism (FA). The K–MINI-MAC demonstrated satisfactory internal consistency (Cronbach's α = 0.50–0.86) and test–retest reliability (0.68–0.88).

"Quality of life" was assessed by the Short-Form Health Survey (SF–8, with a 4-week recall) (Ware et al., 2001), where eight items assess various dimensions of health: general health, physical functioning, role physical, bodily pain, vitality, social functioning, mental health, and role emotional. Two summary scores of physical and mental health (the physical component score [PCS] and the mental component score [MCS]) are provided, and the scores from each item or summary measures range from 0 to 100, with higher scores indicating better health.

"Performance status" was assessed using the Eastern Cooperative Oncology Group (ECOG) scale (Oken et al., 1982). ECOG performance status scores range from 0 (fully active) to 5 (death), with higher values indicating poorer performance status.

The survey also included questions regarding satisfaction with the services provided in terms of cancer treatment, the need for professional psychosocial services, and the experience of complementary and alternative medicine (CAM) or future intention of CAM use. Satisfaction with treatment was rated on a 5-point Likert-type scale (from 1 = "very dissatisfied" to 5 = "very satisfied") and the need for professional psychosocial services on a 3-point scale (0 = no, 1 = yes, sometimes, 2 = yes, often). We also asked patients about their experience with CAM since the cancer diagnosis and whether or not they intended to continue with it.

Statistical Analyses

We conducted a univariate logistic regression analysis in order to explore the sociodemographic, clinical, and psychological factors (e.g., mental adjustment to cancer) associated with DD and AD. Multivariate logistic regression analyses were performed so as to evaluate the degree of association between variables that were significant in the univariate analyses. The impact of psychiatric comorbidity status on QoL, their satisfaction with treatment-related services, and the need for professional psychosocial services were examined utilizing an analysis of covariance (ANCOVA). Chi-square tests were employed to examine the CAM experience and future intention of CAM use in relation to psychiatric comorbidity status. All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS, v. 21 for Windows, SPSS Inc., Chicago, IL).

RESULTS

Participant Characteristics (see Table 1)

Their mean age was 51.2 (SD = 11.58), and there were more females (59.2%) than males. The majority of participants were married (85.5%), educated through to high school or a higher level (70.4%), professed a religion (68.0%), and had a monthly income below 3,000,000 Korean won, equivalent to 2,616 USD (64.4%). With regard to cancer type, most participants had one of the six major types of cancer common among Koreans (breast 30.5%, stomach 14.0%, colorectal 12.7%, lung 10.4%, cervix 4.6%, and liver 3.6%); the remainder had other types (24.2%). The majority of patients had been diagnosed within 24 months (74.1%), as stage 2 or 3 (45.7%), with no recurrence (72.8%) or metastases (64.3%), and had received surgery (73.5%) and/or chemotherapy (82.8%). Most participants were outpatients (67.2%) with an ECOG performance status of 1 ("restricted in physically strenuous activity," 54.8%) or 0 ("fully active," 26.5%).

Prevalence and Correlates of Depressive Disorders

The prevalence of DD determined by the MINI was 16% (64/399). The rate of major depressive single (MDE) was 10.8% (43/399), and that for MDE recurrent was 9.0% (36/399).

The sociodemographic, clinical, and psychological correlates of DD were examined in the univariate and multivariate logistic regression analyses (see Tables 2 and 3 for the results).

Among the sociodemographic factors, age was a significant correlate of DD in the univariate analysis

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Table 1. *Participant characteristics*

Variable	Total sample ($N = 400$)	Depressive disorders		Anxiety disorders	
		Yes (%)	No (%)	Yes (%)	No (%)
Age					
≤40	61 (15.3)	14 (23.0)	47 (77.0)	11 (18.0)	50 (82.0)
41–60	245 (61.3)	41 (16.7)	204 (83.3)	44 (18.0)	200 (82.0)
>60	94 (23.5)	9 (9.7)	84 (90.3)	13 (14.1)	79 (85.9)
Gender					
Male	162 (40.8)	19 (11.7)	143 (88.3)	28 (17.5)	132 (82.5)
Female	235 (59.2)	45 (19.1)	190 (80.9)	40 (17.0)	195 (83.0)
Marital status					
Married	336 (85.5)	57 (17.0)	279 (83.0)	58 (17.4)	276 (82.6)
Unmarried	57 (14.5)	7 (12.3)	50 (87.7)	9 (15.8)	48 (84.2)
Education					
Less than high school	107 (27.9)	21 (19.6)	86 (80.4)	18 (17.1)	87 (82.9)
High school	158 (41.1)	24 (15.2)	134 (84.8)	22 (13.9)	136 (86.1)
College/University	119 (31.0)	18 (15.1)	101 (84.9)	25 (21.0)	94 (79.0)
Religion					
Yes	268 (68.0)	46 (17.2)	222 (82.8)	46 (17.2)	221 (82.8)
No	126 (32.0)	18 (14.3)	108 (85.7)	21 (16.8)	104 (83.2)
Income					
≤3 million won [b]	137 (35.6)	21 (15.3)	116 (84.7)	24 (17.6)	112 (82.4)
<3 million won	248 (64.4)	42 (16.9)	206 (83.1)	41 (16.6)	206 (83.4)
Employment					
Employed	79 (20.3)	8 (10.1)	71 (89.9)	15 (19.0)	64 (81.0)
Unemployed	215 (55.3)	35 (16.3)	180 (83.7)	37 (17.4)	176 (82.6)
Others	95 (24.4)	17 (17.9)	78 (82.1)	13 (13.7)	82 (86.3)
Type of cancer					
Stomach	55 (14.0)	10 (18.2)	45 (81.8)	11 (20.0)	44 (80.0)
Liver	14 (3.6)	1 (7.1)	13 (92.9)	5 (38.5)	8 (61.5)
Lung	41 (10.4)	10 (24.4)	31 (75.6)	11 (27.5)	29 (72.5)
Colorectal	50 (12.7)	9 (18.0)	41 (82.0)	7 (14.0)	43 (86.0)
Breast	120 (30.5)	22 (18.3)	98 (81.7)	18 (15.0)	102 (85.0)
Cervix	18 (4.6)	3 (16.7)	15 (83.3)	2 (11.1)	16 (88.9)
Others	95 (24.2)	9 (9.5)	86 (90.5)	13 (13.7)	80 (86.3)
Stage of cancer					
0	14 (3.6)	2 (14.3)	12 (85.7)	2 (14.3)	12 (85.7)
1	58 (14.8)	7 (12.1)	51 (87.9)	8 (14.0)	49 (86.0)
2	86 (21.9)	17 (19.8)	69 (80.2)	12 (14.0)	74 (86.0)
3	95 (24.2)	20 (21.1)	75 (78.9)	16 (17.0)	78 (83.0)
4	56 (14.3)	8 (14.3)	48 (85.7)	14 (25.0)	42 (75.0)
Don't know	83 (21.2)	9 (10.8)	74 (89.2)	14 (16.9)	69 (83.1)
Performance status					
0	103 (26.5)	10 (9.7)	93 (90.3)	17 (16.7)	85 (83.3)
1	213 (54.8)	32 (15.0)	181 (85.0)	33 (15.5)	180 (84.5)
2–3	73 (18.8)	22 (30.1)	51 (69.9)	16 (22.2)	56 (77.8)

Continued

Table 1. *Continued*

Variable	Total sample ($N = 400$)	Depressive disorders		Anxiety disorders	
		Yes (%)	No (%)	Yes (%)	No (%)
Recurrence/metastases					
None	224 (57.1)	34 (15.2)	190 (84.8)	33 (14.7)	191 (85.3)
Recurrence	36 (9.2)	6 (16.7)	30 (83.3)	7 (20.0)	28 (80.0)
Metastases	66 (16.8)	11 (16.7)	55 (83.3)	17 (25.8)	49 (74.2)
Recurrence & metastases	66 (16.8)	13 (19.7)	53 (80.3)	10 (15.4)	55 (84.6)
Treatment status					
FU	61 (16.3)	9 (14.8)	52 (85.2)	10 (16.4)	51 (83.6)
TX after recurrence	90 (24.0)	19 (21.1)	71 (78.9)	14 (15.7)	75 (84.3)
TX after first diagnosis	224 (59.7)	33 (14.7)	191 (85.3)	41 (18.4)	182 (81.6)
Months since diagnosis					
0–12	229 (60.9)	36 (15.7)	193 (84.3)	37 (16.2)	191 (83.8)
13–24	55 (14.6)	11 (20.0)	44 (80.0)	11 (20.4)	43 (79.6)
25–36	30 (8.0)	3 (10.0)	27 (90.0)	6 (20.0)	24 (80.0)
37–48	15 (4.0)	3 (20.0)	12 (80.0)	3 (20.0)	12 (80.0)
49–60	10 (2.7)	1 (10.0)	9 (90.0)	2 (20.0)	8 (20.0)
<60	37 (9.8)	6 (16.2)	31 (83.8)	4 (10.8)	33 (89.2)

Variables	Total sample, M (SD)	Depressive disorders		Anxiety disorders	
		Yes ($n = 64$), M (SD)	No ($n = 272$), M (SD)	Yes ($n = 68$), M (SD)	No ($n = 329$), M (SD)
Physical symptoms					
Pain	2.64 (2.89)	3.77 (2.93	2.42 (2.84)	3.20 (2.93)	2.54 (2.89)
Fatigue	3.55 (2.83)	5.13 (2.63)	3.25 (2.77)	4.24 (3.02)	3.43 (2.79)
Nausea	2.11 (2.93)	3.31 (3.20)	1.88 (2.82)	2.90 (3.22)	1.98 (2.86)
Disturbed sleep	2.50 (2.94)	4.29 (3.23)	2.16 (2.76)	3.35 (3.02)	2.36 (2.91)
Shortness of breath	1.60 (2.20)	2.56 (2.54)	1.42 (2.09)	1.98 (2.24)	1.54 (2.20)
Problem with remembering	2.13 (2.45)	3.27 (2.46)	1.91 (2.39)	2.76 (2.83)	2.02 (2.37)
Lack of appetite	2.82 (3.07)	4.52 (3.04)	2.50 (2.98)	3.45 (2.99)	2.72 (3.08)
Feeling drowsy	2.45 (2.52)	3.83 (2.79)	2.19 (2.38)	2.51 (2.66)	2.45 (2.50)
Dry mouth	3.11 (2.96)	4.75 (3.09)	2.80 (2.92)	4.16 (3.13)	2.93 (2.90)
Vomiting	1.49 (2.63)	2.73 (3.29)	1.25 (2.42)	2.14 (3.01)	1.38 (2.54)
Numbness or tingling	2.95 (3.08)	4.25 (3.25)	2.70 (2.99)	3.90 (3.60)	2.79 (2.96)
Mental adjustment to cancer					
Helpless/hopeless	1.69 (0.58)	2.00 (0.64)	1.63 (0.54)	1.81 (0.56)	1.67 (0.58)
Anxious preoccupation	2.39 (0.66)	2.78 (0.54)	2.32 (0.65)	2.78 (0.51)	2.32 (0.66)
Cognitive avoidance	2.57 (0.70)	2.82 (0.54)	2.53 (0.72)	2.78 (0.62)	2.54 (0.71)
Fatalism	2.79 (0.58)	2.86 (0.51)	2.78 (0.60)	2.93 (0.53)	2.76 (0.59)
Fighting spirit	2.85 (0.57)	2.86 (0.49)	2.84 (0.59)	2.98 (0.46)	2.82 (0.59)

[a] Eastern Cooperative Oncology Group Performance status: 0 = fully active, able to carry on all predisease performance without restriction; 1 = restricted in physically strenuous activity but ambulatory and able to carry out work of a light and sedentary nature; 2 = ambulatory and capable of all self-care but unable to carry out any work activities; 3 = capable of only limited self-care.
[b] 3 million Korean won (equivalent to 2,616 USD).

Table 2. *Univariate logistic analyses for depressive and anxiety disorders*

	Depressive disorders		Anxiety disorders	
	Univariate analyses		Univariate analyses	
Variable	*OR* ($CI_{95\%}$)	*p*	*OR* ($CI_{95\%}$)	*p*
Age				
≤40	1		1	
41–60	0.68 (0.34–1.34)	0.26	1.00 (0.48–2.08)	1.00
<60	**0.36 (0.15–0.89)**	**0.03**	0.75 (0.31–1.80)	0.52
Gender				
Male	1		1	
Female	1.78 (1.00–3.18)	**0.05**	0.97 (0.57–1.65)	0.90
Marital status				
Married	1		1	
Unmarried	0.69 (0.30–1.59)	0.38	0.89 (0.42–1.92)	0.77
Education				
Less than high school	1		1	
High school	0.73 (0.39–1.40)	0.35	0.78 (0.40–1.54)	0.48
College/university	0.73 (0.37–1.46)	0.37	1.29 (0.66–2.52)	0.46
Religion				
Yes	1		1	
No	0.80 (0.45–1.45)	0.47	0.97 (0.55–1.71)	0.92
Income				
≤3 million won	1		1	
<3 million won	1.13 (0.37–1.99)	0.68	0.93 (0.53–1.62)	0.79
Employment				
Employed	1		1	
Unemployed	1.73 (0.76–3.90)	0.19	0.90 (0.46–1.74)	0.75
Other	1.93 (0.79–7.46)	0.15	0.68 (0.30–1.52)	0.35
Type of Cancer				
Stomach	1		1	
Liver	0.35 (0.05–2.96)	0.33	2.5 (0.68–9.16)	0.17
Lung	1.45 (0.54–3.90)	0.46	1.52 (0.58–3.96)	0.39
Colorectal	0.99 (0.37–2.67)	0.98	0.65 (0.23–1.84)	0.42
Breast	1.01 (044–2.31)	0.98	0.71 (0.31–1.62)	0.41
Cervix	0.90 (0.22–3.71)	0.88	0.50 (0.10–2.51)	0.40
Other	0.47 (0.18–1.24)	0.13	0.63 (0.26–1.53)	0.31
Stage of cancer				
0	1		1	
1	0.82 (0.15–4.48)	0.82	0.98 (0.18–5.22)	0.98
2	1.48 (0.30–7.24)	0.63	0.97 (0.19–4.90)	0.97
3	1.60 (0.33–7.74)	0.56	1.23 (0.25–6.04)	0.80
4	1.00 (0.19–5.33)	1.00	2.00 (0.40–10.05)	0.40
Don't know	0.73 (0.14–3.80)	0.71	1.22 (0.25–6.05)	0.81
Performance status				
0	1		1	
1	1.64 (0.77–3.49)	0.20	0.92 (0.48–1.74)	0.79
2–3	**4.01 (1.76–9.13)**	**<0.001**	1.43 (0.67–3.06)	0.36
Recurrence/metastases				
None	1		1	
Recurrence	1.12 (0.43–2.89)	0.82	1.45 (0.58–3.58)	0.43
Metastases	1.12 (0.53–2.35)	0.77	**2.01 (1.03–3.90)**	**0.04**
Recurrence & metastases	1.37 (0.68–2.78)	0.38	1.05 (0.49–2.27)	0.90
Treatment status				
Follow-up	1		1	
TX after recurrence	1.55 (0.65–3.69)	0.33	0.95 (0.39–2.31)	0.91
TX after first diagnosis	1.00 (0.45–2.22)	1.00	1.15 (0.54–2.45)	0.72
Months since diagnosis				
0–12	1		1	
13–24	1.34 (0.63–2.84)	0.44	1.32 (0.62–2.80)	0.47
25–36	0.60 (0.17–2.07)	0.42	1.29 (0.49–3.38)	0.60
37–48	1.34 (0.36–4.99)	0.66	1.29 (0.35–4.80)	0.70

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Table 2. *Continued*

Variable	Depressive disorders		Anxiety disorders	
	Univariate analyses		Univariate analyses	
	OR ($CI_{95\%}$)	*p*	*OR* ($CI_{95\%}$)	*p*
49–60	0.60 (0.07–4.85)	0.63	1.29 (0.26–6.32)	0.75
>60	1.04 (0.40–2.67)	0.94	0.63 (0.21–1.87)	0.40
Physical symptoms				
Pain	1.16 (1.05–1.27)	<0.001	1.08 (0.98–1.19)	0.14
Fatigue	1.26 (1.13–1.41)	<0.001	1.11 (0.99–1.23)	0.07
Nausea	1.16 (1.06–1.27)	<0.001	1.10 (1.00–1.21)	0.05
Disturbed sleep	1.24 (1.13–1.37)	<0.001	1.11 (1.01–1.22)	**0.03**
Shortness of breath	1.22 (1.08–1.38)	<0.001	1.09 (0.96–1.23)	0.20
Problem with remembering	1.22 (1.09–1.36)	<0.001	1.12 (0.99–1.25)	0.06
Lack of appetite	1.22 (1.11–1.33)	<0.001	1.08 (0.98–1.18)	0.13
Feeling drowsy	1.26 (1.13–1.41)	<0.001	1.01 (0.90–1.14)	0.88
Dry mouth	1.24 (1.12–1.36)	<0.001	1.14 (1.04–1.26)	**0.01**
Vomiting	1.19 (1.08–1.31)	<0.001	1.10 (0.99–1.22)	0.06
Numbness or tingling	1.16 (1.06–1.27)	<0.001	1.12 (1.02–1.22)	**0.02**
Mental adjustment to cancer				
Helpless/hopeless	2.90 (1.72–4.90)	<0.001	1.49 (0.89–2.47)	0.13
Anxious preoccupation	3.54 (2.02–6.20)	<0.001	3.37 (1.91–5.94)	**<0.001**
Cognitive avoidance	1.90 (1.18–3.06)	<0.001	1.71 (1.06–2.76)	**0.03**
Fatalism	1.27 (0.75–2.14)	0.37	1.65 (0.95–2.86)	0.08
Fighting spirit	1.06 (0.63–1.80)	0.82	1.63 (0.92–2.89)	0.09

but was not in the multivariate analysis. The risk of DD was significantly lower in patients over the age of 60 compared to those under 40 (odds ratio [*OR*] = 0.36, $p = 0.03$). There was a trend of association between female gender and DD ($OR = 1.78$, $p = 0.05$), but this relationship was not statistically significant.

Among the clinical variables, ECOG performance status was found to be related to DD in the univariate analysis. The risk of DD was significantly higher in patients who were "ambulatory and capable of all self-care, but unable to carry out any work activities" (2) and "capable of only limited self-care" (3) when compared to those who were "fully active" (0) ($OR = 4.01$, $p < 0.001$).

Regarding physical symptoms, all were significantly associated with DD in the univariate analysis. A one-unit increase in each symptom was associated with a 1.16- to 1.26-fold higher risk of DD.

With regard to mental adjustment to cancer, HH, AP, and CA were significant correlates of DD. A one-unit increase in HH was related to a 2.9-fold increased risk of DD, while the risk of AP was 3.54 times higher and that of CA 1.90-fold higher.

The results of hierarchical multivariate logistic regression analysis with significant variables in univariate analyses are presented in Table 3. These variables explained 26% of the variance for DD (Nagelkerke $R^2 = 0.26$), and the Hosmer–Lemeshow test indicated an appropriate model fit ($\chi^2_{(8)} = 9.37$, $p = 0.31$). None of the variables significant in the univariate analysis reached statistical significance. However, there was a nonsignificant trend for an association between the symptom of "feeling drowsy" and AP, such that a one-unit increase in "feeling drowsy" was associated with a 1.16-fold higher risk of AP ($p = 0.09$), while each unit increase in AP was associated with a 2.29-fold higher risk of DD ($p = 0.06$).

Prevalence and Correlates of Anxiety Disorders

The prevalence of any AD was 17.1% (68/397): panic disorder 0.8% (3/399); agoraphobia 2.5% (10/399); social phobia 4.5% (18/398); specific phobia 3.0% (12/398); OCD 2.3% (9/398); PTSD 1.5% (6/398); and GAD 6.8% (27/398).

The correlates of AD were examined in univariate and multivariate analyses, the results of which are provided in Tables 2 and 3.

Among the sociodemographic and clinical variables, only the presence of metastases was significantly associated with AD, the risk being 2.01 times higher in patients with metastases ($p = 0.04$). Among the physical symptoms, "disturbed sleep" ($OR = 1.11$, $p = 0.03$); "dry mouth" ($OR = 1.14$, $p = 0.01$); and "numbness or tingling" ($OR = 1.12$, $p = 0.02$) were significant correlates.

In terms of mental adjustment to cancer, AP and CA were significant correlates, where the risk of AD

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Table 3. *Multivariate logistic analyses for depressive and anxiety disorders*

	Multivariate analyses			
	Depressive disorders ($n = 307$)		Anxiety disorders ($n = 311$)	
Variable	*OR* ($CI_{95\%}$)	*p*	*OR* ($CI_{95\%}$)	*p*
Age				
≤40	1			
41–60	0.51 (0.20–1.28)	0.15		
>60	0.47 (0.15–1.53)	0.21		
Performance status				
0	1			
1	0.66 (0.25–1.76)	0.41		
2–3	2.22 (0.72–6.82)	0.16		
Recurrence/metastases				
None			1	
Recurrence			1.17 (0.37–3.62)	0.80
Metastases			2.10 (0.91–4.84)	0.08
Recurrence & metastases			1.11 (0.45–2.76)	0.83
Physical symptoms				
Pain	0.98 (0.84–1.14)	0.77		
Fatigue	1.05 (0.87–1.27)	0.62		
Nausea	0.87 (0.70–1.08)	0.20		
Disturbed sleep	1.07 (0.92–1.23)	0.39	0.98 (0.86–1.11)	0.76
Shortness of breath	1.02 (0.86–1.22)	0.83		
Problem with remembering	1.01 (0.86–1.20)	0.87		
Lack of appetite	1.03 (0.89–1.20)	0.71		
Feeling drowsy	1.16 (0.98–1.37)	0.09		
Dry mouth	1.08 (0.94–1.25)	0.27	1.09 (0.97–1.24)	0.16
Vomiting	1.16 (0.95–1.43)	0.15		
Numbness or tingling	0.91 (0.79–1.06)	0.22	1.00 (0.88–1.13)	0.93
Mental adjustment to cancer				
Helpless/hopeless	1.43 (0.66–3.07)	0.36		
Anxious preoccupation	2.29 (0.96–5.48)	0.06	**2.94 (1.47–5.89)**	**<0.001**
Cognitive avoidance	1.37 (0.72–2.60)	0.34	1.01 (0.55–1.87)	0.98

was 3.37 times higher with a one-unit increases in AP and the risk of CA was 1.71 times higher.

The results of multivariate logistic regression analysis with the significant variables in univariate analyses are summarized in Table 3. These variables explained 14% of the variance for AD (Nagelkerke $R^2 = 0.14$), and the Hosmer–Lemeshow test indicated an appropriate model fit ($\chi^2_{(8)} = 5.00$, $p = 0.76$). Only AP remained significant in the multivariate analysis, with a one-unit increase in AP being associated with a 2.94-fold increased risk of AD. There was a trend for the presence of metastases to be related to a higher risk of AD ($OR = 2.10$, $p = 0.08$), but this effect was not statistically significant.

Impact of Psychiatric Comorbidity on Quality of Life and Other Outcomes

The results of the ANCOVA examining the impact of psychiatric comorbidity status on QoL and other outcomes are presented in Table 4. The factors that were significantly correlated with QoL (i.e., age, gender, marital status, education, religion, income, employment status, and ECOG performance status) and other outcomes (i.e., age, marital status, ECOG performance status and need for psychosocial services) were entered as covariates.

Overall, psychiatric comorbidity status affected all eight dimensions of QoL and the PCS and MCS, and, in general, patients with a comorbidity had lower scores, with varying effect sizes.

The associations between psychiatric comorbidity status and QoL were particularly prominent for role emotional (RE, $\eta^2 = 0.17$); mental health (MH, $\eta^2 = 0.13$), and mental QoL (MCS, $\eta^2 = 0.14$). The levels of RE and MCS were highest in patients with no psychiatric comorbidity, followed by those with AD and DD. Patients with concurrent DD and AD reported lower RE and MCS, but their RE and MCS levels did not significantly differ from the corresponding values seen in patients with a single comorbidity. The MH level was lower in patients with any psychiatric comorbidity compared to those with none.

The level of general health was highest in patients with no psychiatric comorbidities, followed by participants with AD and DD, and then those with

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Table 4. *Quality of life across psychiatric comorbidity status*

Variables	None [a] ($n = 289$) *M (SD)*	Depressive disorders [b] ($n = 40$) *M (SD)*	Anxiety disorders [c] ($n = 44$) *M (SD)*	Depressive and anxiety disorders [d] ($n = 24$) *M (SD)*	*F*	η^2	Post-hoc
General health	42.48 (0.45)	38.99 (1.22)	39.51 (1.25)	34.92 (1.59)	9.40***	0.08	d < b, c < a
Physical functioning	43.22 (0.46)	38.02 (1.26)	40.39 (1.28)	39.91 (1.63)	6.49***	0.06	c, b < a
Role physical	43.18 (0.53)	37.01 (1.43)	39.44 (1.47)	38.89 (1.87)	7.48***	0.06	b, c, d < a
Bodily pain	50.20 (0.57)	43.90 (1.53)	45.36 (1.57)	43.76 (1.99)	9.01***	0.08	b, c, d < a
Vitality	45.27 (0.51)	41.52 (1.38)	44.88 (1.41)	40.56 (1.79)	3.91*	0.03	b, d < a
Social functioning	44.87 (0.58)	38.24 (1.57)	40.38 (1.61)	40.41 (2.04)	7.38***	0.06	b, c, d < a
Mental health	50.36 (0.49)	42.29 (1.35)	45.81 (1.36)	43.49 (1.72)	15.61***	0.13	b, c, d < a
Role emotional	44.49 (0.45)	35.71 (1.21)	40.27 (1.26)	36.57 (1.61)	21.97***	0.17	d < a, b < c<a
Physical scale sum (PCS)	42.75 (0.50)	37.32 (1.37)	38.97 (1.40)	37.18 (1.79)	8.05***	0.07	b, c, d < a
Mental scale sum (MCS)	48.77 (0.54)	39.43 (1.49)	43.86 (1.52)	40.36 (1.94)	17.12***	0.14	d < a, b < c<a
Satisfaction with overall service	5.56 (0.79)	3.55 (2.13)	7.91 (2.03)	3.25 (2.75)	0.98	-	—
Need for professional psychosocial service	1.39 (0.03)	1.72 (0.09)	1.74 (0.09)	1.48 (0.12)	7.28***	0.06	a < b, c

* Satisfaction with overall service: item mean (1 = very dissatisfied, ~5 = very satisfied).
** Need for professional psychosocial service: item mean (0 = no; 1 = yes, sometimes; 2 = yes, often).
*** $p < 0.001$.

concurrent DD and AD ($\eta^2 = 0.08$). Also, physical QoL (PCS) was significantly lower in patients with psychiatric comorbidities compared with those with none ($\eta^2 = 0.07$). The level of social functioning was lower in patients with DD and AD compared to those with no psychiatric comorbidity ($\eta^2 = 0.06$). In the dimensions of role physical ($\eta^2 = 0.06$) and bodily pain ($\eta^2 = 0.08$), patients with a psychiatric comorbidity scored lower compared to those with none. The level of physical functioning was higher in patients with no psychiatric comorbidity compared to patients with DD and AD ($\eta^2 = 0.06$). Vitality was lower in patients with DD and with concurrent DD and AD compared to those with no psychiatric comorbidity ($\eta^2 = 0.03$).

Satisfaction with the services received related to cancer treatment did not show significant differences across the status of psychiatric comorbidity [$F = 0.98$, $p = 0.40$]. Similarly, neither CAM ($\chi^2 = 2.19$, $p = 0.90$) use since cancer diagnosis nor future intention to use CAM ($\chi^2 = 6.78$, $p = 0.87$) significantly differed across psychiatric comorbidity status.

On the other hand, the need for professional psychosocial services significantly differed across psychiatric comorbidity status [$F = 7.28$, $p < 0.000$, $\eta^2 = 0.06$]. Post-hoc analysis indicated that, as compared to patients with no psychiatric comorbidity, those with DD and AD reported a significantly higher need.

DISCUSSION

The present study examined depressive and anxiety disorders in patients with mixed types of cancer in a multi-institutional study, exploring its sociodemographic, clinical, and psychological correlates, as well as its association with QoL and other outcomes.

Above all, a substantial proportion of our patients had DD and AD (16 and 17.1%, respectively), which is considerably higher than the prevalence of 3.1% for MDD and 6.8% for AD observed in the general population in a Korean epidemiologic catchment area study (Cho et al., 2015). Major depressive episode single was the most common morbidity (10.8% of patients), while GAD was common among patients with AD (6.8%), which was a higher rate than that reported in the general Korean population (lifetime prevalence = 1.9%, 12-month prevalence = 1.0%) by Cho et al. (2015). Although a direct comparison is not possible due to the difference between incidence and prevalence and different assessment methods, the prevalence of DD and AD in the present study appears to be higher than the incidence of AD (3.37%) and DD (2.45%) reported in the National Registry data from the Korean National Health Insurance Services (Lee et al., 2015). This seeming discrepancy

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might reflect the fact that, although a significant proportion of cancer patients might have a psychiatric comorbidity, the rates of patients who were actually diagnosed or treated for such a condition in healthcare settings might be low, given that the incidence rates from the National Registry data are derived from the actual insurance claims data for the entire Korean population (Kang et al., 2008). In this regard, previous studies have suggested that not all patients with a psychiatric morbidity receive mental health services. In fact, 55% of advanced cancer patients with a psychiatric disorder were reported not to have received mental health services by Kadan-Lottick et al. (2005). In a Japanese study, among 39 patients with possible major depression, 61.5% knew about the psychiatric division at their institution, but only 29.7% received such services (Fujisawa et al., 2010). There might be several reasons why patients with psychiatric comorbidity do not report the need for or seek professional help. First of all, one study found that a high probability of mental health visits was associated with race and unmarried status, but not with depression (Brown et al., 2010), suggesting that individual sociodemographic factors were a better predictor of seeking help seeking for mental health issues. Furthermore, patients might consider the diagnosis of a psychiatric disorder and use of psychiatric services as stigmatizing (Patrick et al., 2003), they might lack insight regarding the cause and negative impact of their distress (Ryan et al., 2012), or perhaps they believe that they do not need help with mental health issues (Carlson et al., 2004). Related to the latter reason, considering that a previous review on supportive care needs among breast cancer patients (Fiszer et al., 2014) suggested that Asian women report greater information needs and lower psychological needs compared to Western women, potential crosscultural differences regarding supportive care may also be considered. In fact, higher informational needs in Korean patients with breast cancer have also been observed (Yi et al., 2007).

Moreover, the prevalence found in the present study is similar to the values reported in a metaanalysis of 70 interview-based studies in oncological and hematological settings (Mitchell et al., 2011): the prevalence of DSM- or ICD-defined depression was 16.3% (95% confidence interval [$CI_{95\%}$] = 13.4–19.5); 14.9% ($CI_{95\%}$ = 12.2–17.7) for DSM-defined major depression; and 10.3% ($CI_{95\%}$ = 5.1–17.0) for AD. Similarly, the current and 12-month rates of affective disorders determined by the Composite International Diagnostic Interview were 9.5 and 17.5%, respectively, while the rates for AD were 13.0 and 20.5% in a German study with 200 patients with various types of cancer (Härter et al., 2001). Comparable rates of 8.5% for major and minor depressive disorder ($CI_{95\%}$ = 5.2–11.8%), defined by the structured clinical interview in the DSM–IV, were also reported in 282 Japanese patients with mixed types of cancer (Kawase et al., 2006). The prevalences observed in the present and previous studies indicate that cancer patients are vulnerable to psychiatric comorbidity, necessitating its regular monitoring as an integrative part of their cancer care.

With respect to the sociodemographic correlates of psychiatric comorbidity, age was found to be a significant correlate of DD in the univariate analysis, while none were statistically significant with respect to AD. Patients aged over 60 had a lower risk of DD compared to those younger than 40 years of age, which is in line with prior findings (Burgess et al., 2005; Mosher & Danoff-Burg, 2006). Interestingly, younger age was a significant predictor of psychological comorbidity in breast cancer survivors (Mehnert & Koch, 2008). Although marginally significant, female gender showed a trend of association with DD, consistent with the finding that a diagnosis of a current affective disorder was higher in females and its diagnosis in women was related to cancer (Härter et al., 2001).

Among the clinical factors, congruent with previous reports (Akechi et al., 2004; Härter et al., 2001; Jeon et al., 2007; Spencer et al., 2010), a poor ECOG performance status score was significantly associated with a 4.01-fold higher risk of DD in our univariate analysis. In fact, Akechi et al. (2004) found that a lower performance status along with a greater concern about being a burden to others and a lower satisfaction with social support were significantly associated with major depression at baseline in a prospective study with terminally ill cancer patients in Japan. However, the mutual causative nature of a relationship between performance status and DD should be considered when interpreting the observed association. For instance, depression scores constituted the sole variable contributing to patient-evaluated performance status in cancer patients (Jeon et al., 2007).

With respect to anxiety disorders, patients with metastases were at a 2.01-told higher risk compared to those with neither recurrence nor metastases. This finding is consistent with previous results indicating an independent association of the presence of metastases with anxiety in cancer patients (Vodermaier et al., 2011). Patients with poor performance status or advanced status with metastasis have a heavier physical and psychosocial burden related to cancer (Lo et al., 2010), thus increasing their risk for psychiatric comorbidity.

All the physical symptoms were significantly correlated with DD, while only the symptoms of

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"disturbed sleep," "dry mouth," and "numbness or tingling" were related to AD in our univariate analysis. In the multivariate analysis, none of the physical symptoms significant in the univariate analysis reached statistical significance for both DD and AD. However, there was a trend toward a marginally significant association between the symptom of "feeling drowsy" and DD, which is in line with a previous finding that depressed patients with cancer reported a higher frequency and intensity of drowsiness (Delgado-Guay et al., 2009). Similarly, an examination of the physical symptom profiles of 121 hospitalized cancer patients revealed that insomnia was the most prevalent symptom in cancer patients and that depressed patients were more likely to report a greater number of symptoms (Chen & Chang, 2004). The association of AD with "dry mouth" and "numbness or tingling" is understandable given that these symptoms are standard somatic symptoms of AD (Stark & House, 2000). In addition, sleep disturbances have been observed in advanced cancer patients (Mystakidou et al., 2005). However, as disturbed sleep, dry mouth, and numbness or tingling were the second, fourth, and fifth most severe symptoms among the 13 core oncology symptoms reported in a study with 3,106 ambulatory patients with breast, prostate, colon/rectum, or lung cancer (Cleeland et al., 2013), these symptoms' association with cancer treatment in patients with AD should also be considered. In this regard, in addition to the need to consider the bidirectional nature of the relationship between a physical symptom and DD or AD, it should be noted that physical symptoms might reflect disease- or treatment-related effects. For instance, "tingling" might be related to peripheral neuropathy or the toxicity of taxanes (Argyriou et al., 2008), while disturbed sleep might be related to fatigue (Anderson et al., 2003). In fact, fatigue, depression, and sleep disturbances are frequently cooccurring behavioral symptoms of cancer treatment (Bower et al., 2011). With regard to the complex relationships among physical symptoms, psychiatric morbidity, and different cancer treatments, further crosscultural issues may also be considered. Specifically, though not significant in our multivariate analysis, the level of fatigue, a significant correlate of DD, appears to be higher in patients with DD in the present study. While the association of fatigue with cancer treatment has been established (Berger et al., 2012), a prior study examining the crossnational differences of the pattern of depressive symptoms between Koreans and Americans indicated that Koreans with MDD tend to report incidences of low energy and difficulties with concentration compared to the depressed mood and thoughts of death reported by American patients (Chang et al., 2008).

With regard to a psychological correlate (i.e., mental adjustments), HH, AP, and CA were associated with DD, but none of these observed associations reached statistical significance in our multivariate analysis. At the same time, there was a trend toward a marginally significant relationship between AP and DD. For AD, AP and CA were significant in the univariate analysis, while only AP remained significant in our multivariate analysis ($OR = 2.94$). This association of HH and AP with depression and anxiety is consistent with prior findings (Andreu et al., 2012; Grassi et al., 2004; Tojal & Costa, 2015). A study with laryngeal cancer patients found that patients who experienced HH and AP reported higher depression and anxiety and decreased QoL (Johansson et al., 2011). Another previous study suggested that intrusive cognition plays a role in the association between anxiety and AP and HH. In fact, anxious patients reported more intrusive cognition when compared to patients who were not anxious. Furthermore, the presence of intrusive cognition was significantly related to maladjustment, including AP and HH (Whitaker et al., 2008). In a study with 150 hospitalized cancer patients, AP and HH were found to be strong determinants of the severity of trauma-related symptoms, accounting for 49% of the variance with respect to symptom severity (Oniszczenko & Laskowska, 2014). Similarly, the caseness of AP was associated with unmet needs for help across all domains in cancer survivors (Boyes et al., 2012), warranting careful attention to this kind of patient response.

With regard to the impact of psychiatric comorbidity status, consistent with previous findings (Hegel et al., 2006), psychiatric comorbidity had an overall negative association with QoL. In fact, depression was shown to have a pervasive association with various domains of health-related QoL and disability in 405 cancer patients by Brown et al. (2010). They found that the presence of psychiatric comorbidity explained 17% of the variance of role emotional on the SF−8, in line with the significant association previously observed between psychiatric disorders and lower emotional functioning (Okamura et al., 2005). Furthermore, psychiatric comorbidity explained 14% of the variance for mental component scores. In terms of physical functioning, the difference was significant between patients with no psychiatric comorbidity and those with DD or AD. The significant negative association of DD with physical functioning was prominent, fully in line with the previously observed association between low levels of physical function and affective disorders (Härter et al., 2001). Our findings suggest that efforts to improve QoL in cancer should include care of psychiatric comorbidities (Miovic & Block, 2007).

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In addition, as expected, the need for professional psychosocial services was higher in patients with DD or AD compared to those with neither. However, this need was not significantly higher in patients with concurrent DD and AD when compared to those with a single comorbidity or with none. In a study with 381 patients in palliative cancer care (Wilson et al., 2007), individuals with comorbid depression and anxiety disorder reported a higher level of sense of coping poorly and a loss of control when compared to those with only depression, which might affect motivation to seek help. This aspect also requires further investigation. In a study with advanced cancer patients, discussing mental health issues after a cancer diagnosis was the strongest predictor of receiving mental health services (Kadan-Lottick et al., 2005). As such, efforts to overcome these barriers to adequate care can benefit from integration of care for psychiatric comorbidities into routine cancer care.

STRENGTHS AND LIMITATIONS OF THE STUDY

The present study has several limitations that need to be addressed in future research. Above all, due to its cross-sectional design, any causal interpretation of the association between DD, AD, and their correlates cannot be made. For instance, regarding the association between physical symptoms and DD or AD, as their influence is reciprocal (Lloyd-Williams et al., 2004), the direction of the relationship should be determined in the context of a prospective and longitudinal examination. Also, due to the use of convenience sampling, we cannot truly determine response rates. Thus, a potential sample bias cannot be excluded, which might compromise the representativeness of our sample and the generalizability of our findings. Nonsignificant associations between variables that were previously identified as significant correlates in prior research and DD and AD might be due to the fact that the present study was underpowered. Moreover, there is a risk that the participants may have been hesitant to answer truthfully regarding the presence of psychiatric problems due to the stigma associated with mental illness, in addition to the stigma connected with cancer (Cho et al., 2013). In a related way, the stigma of cancer itself might be a significant correlate of psychiatric morbidity. For instance, the results of a nationwide survey involving 466 cancer survivors in Korea found that more than 30% of respondents had a negative attitude toward cancer and stereotypical views of themselves, while about 10% reported experiences of social discrimination due to cancer. This experience of cancer stigma was associated with a 2.5-fold higher risk of depression when compared to patients with positive attitudes (Cho et al., 2013). Also, several significant variables identified as significant correlates of psychiatric morbidity in cancer, such as social support (Akechi et al., 2004; Eom et al., 2013), were not included in our study. In this regard, a national survey involving 296 patient–caregiver dyads in Korea demonstrated that the family's avoidance of communication about the cancer and the level of emotional support were associated with patients' anxiety and depression (Jeong et al., 2016), warranting the need to include these factors in future studies. Finally, our data were collected in 2009, and there may have been changes in some aspects of the study variables (e.g., the use of CAM or the need for psychosocial services), warranting caution about the applicability of our findings.

Despite these limitations, to the best of our knowledge, the present study is one of the first to provide comprehensive information about the prevalence and correlates of DD and AD in cancer patients with the most common types of cancer in Korea, as well as on its impact on patient QoL and other outcomes. Given the substantial prevalence and pervasive association of DD and AD with various aspects of QoL, their assessment and care should be integrated as a regular part of oncological care throughout the cancer continuum, as recommended by the American Society of Clinical Oncology (Andersen et al, 2014).

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DISCLOSURES

The authors hereby declare that they have no conflicts of interest to disclose.

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