Family Members of Cancer Patients in Korea Are at an Increased Risk of Medically Diagnosed Depression

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Objectives: Family members are often cancer patients' primary source of social and emotional support and make a major contribution to how well patients manage their illness. We compared the prevalence of depression in the family members of cancer patients and the general population.

Methods: This study used the data from the fourth, fifth, and sixth rounds of the Korea National Health and Nutrition Examination Survey. The variable of interest was the presence of a cohabitating cancer patient in the family and the dependent variable was the presence of diagnosed depression.

Results: The odds of having medically diagnosed depression in those with a cohabitating cancer patient in the family were significantly higher than among those who did not have cancer patients in their families (odds ratio [OR], 1.56; 95% confidence interval [CI], 1.12 to 2.17; $p=0.009$). The OR for females was 1.59, and this increase was statistically significant (95% CI, 1.09 to 2.31; $p=0.02$).

Conclusions: We need to invest more effort into diagnosing and managing depression in the family members of cancer patients. This will have an impact both on their quality of life and on the well-being of patients, as supporters and caregivers play an instrumental role in helping patients manage their illness.

Key words: Neoplasms, Family, Caregivers, Depression

INTRODUCTION

Cancer is a major cause of mortality worldwide, causing 8.2 million deaths in 2012 [1]. Advances in diagnosis and treatment over recent decades have led to improved survival rates in developed countries [2]. However, the burden of cancer remains significant, as approximately 14.1 million new cancer cases worldwide occurred in 2012 [3], and an estimated 196.3 million years of healthy life were lost in 2013 because of cancer [4].

A cancer diagnosis has a significant impact not only on the patient, but also on his or her family members [5]. Typically, family caregivers (FCs) are patients' primary source of social and emotional support and make a major contribution to how well patients manage their illness [5-8]. Therefore, the physical, emotional, and practical problems faced by family members are very significant issues [9].

FCs often experience a decline in physical health, personal welfare, and well-being, including an increase in psychological distress and a decline in mental health [10,11]. Previous studies have suggested that FCs experience more depression and anxiety than non-caregivers [5,12]. According to Edwards and

Clarke [13], depression may decrease caregivers' quality of life (QoL) and impair their ability to care for the cancer patient. Therefore, they suggest that attention should be focused on depression and anxiety not only in patients, but in all family members. In this context, Lee et al. [14] demonstrated that early screening and management of depression in caregivers could improve their QoL and capability to care for patients.

In Korea, a number of studies have focused on the FCs of cancer patients. Park et al. [15] determined the prevalence and identified predictors of anxiety and depression among FCs of patients with cancer. In addition, they reported that FCs with anxiety or depression were at a high risk for suicide [9]. Yoon et al. [16], in an investigation of modifiable factors associated with the burdens faced by the FCs of cancer patients in Korea, reported that the time spent providing care was a modifiable risk factor. Song et al. [17] showed that the FCs of patients with terminal cancer experienced mental health problems and deterioration of health-related QoL. Moreover, in an analysis using Beck Depression Inventory scores, Rhee et al. [18] showed a high prevalence of depression in the FCs of cancer patients.

However, few studies have investigated depression in the family members of cancer patients. Diagnosed depression incurs actual medical costs for the family of the cancer patient, so it could be more meaningful than undiagnosed depression. Unlike previous studies, the present study used physician-diagnosed depression as the dependent variable [19].

The ongoing increase in cancer, with the consequent increase in the number of family members of cancer patients, is also a very important problem. In this study, we did not limit the analysis to FCs, but expanded the scope somewhat to analyze entire cohabitating families. Using nationally representative data, this research compared the prevalence of depression diagnoses in the family members of cancer patients with the prevalence in the general population.

METHODS

Data Source and Study Population

This study used data from the fourth, fifth, and sixth rounds of the Korea National Health and Nutrition Examination Survey (KNHANES IV-VI, 2007-2014), which is a national survey conducted annually by the Korea Centers for Disease Control and Prevention (KCDC). The survey, which aims to assess the health status and the health-related perceptions and behav-

iors of Koreans, provides reliable and representative results from the national, municipal, and provincial levels. All survey respondents provided written informed consent, and the institutional review board of Yonsei University Graduate School of Public Health approved the study (no. 2016-413-01).

This survey included a total of 30 500 households over an 8-year period, and targeted all family members older than 1 year of age. Of the 65 973 subjects in the initial dataset (male: 29 956; female: 36 017), we first excluded 15 879 subjects who were less than 19 years old. Participants who did not respond to the survey question regarding diagnosed depression (n= 4316) were excluded. Cancer patients (n=1596) and 1-person households (n=5115) were also excluded from the analysis to reflect the effects on the 'family' itself. Finally, we excluded subjects with relevant missing values for the independent variables (n=1159), resulting in a final study population of 38 126 (male: 16 808; female: 21 318).

Dependent Variable

The outcome variable was the presence of diagnosed depression. The KNHANES inquiry regarding diagnosed depression was "Have you ever been diagnosed with depression by a doctor?" and the response choices were binary (yes or no).

Family Members of Cancer Patients (Variable of Interest)

We identified cancer patients as those who were diagnosed with any type of cancer during their lifetime by a physician. People who had the same household ID as those subjects were defined as family members of cancer patients. Subjects for whom no family member had a history of cancer diagnosis were defined as not being family members of cancer patients. In the KNHANES, family members who do not live together are not included as members of the same household; therefore, they were not naturally included in this study. As an additional analysis, the period from the cancer diagnosis and the type of cancer were further analyzed to more closely account for cancer patient characteristics.

Covariates

The independent variables included sex, age group, family income, educational level, number of family members, marital status, jobs, self-reported health condition, the presence of underlying chronic disease, and the study year. Age was used as a continuous variable in previous research [11,12], but we

divided participants by age into 6 categories (19-29, 30-39, 40-49, 50-59, 60-69, and 70 years or older). The family income variable was categorized into 4 quartiles, adjusted by family size. Educational level was categorized into 4 groups (graduation from university or higher, graduation from high school, graduation from middle school, and graduation from elementary school). Participants were categorized by their number of family members into 3 groups (2, 3, or 4 or more family members). Marital status was categorized as married, separated or divorced, and single. Participants were divided into 2 groups according to employment status. Self-reported health condition was classified as good, usual, or bad. Underlying disease was considered to be present if the respondent had been diagnosed with hypertension, diabetes, stroke, heart disease, arthritis, or chronic renal disease by a doctor. Most variables had statistically significant associations with diagnosed depression.

Statistical Analysis

The data analysis was conducted using the chi-square test for the comparison of demographic, socioeconomic, and health-related factors between the groups. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated using multiple logistic regression to identify factors with a significant relationship with diagnosed depression by sex. Moreover, a set of subgroup analyses were performed to identify the independent effects of socioeconomic factors.

The statistical analysis was carried out on the weighted data using the SURVEYFREQ and SURVEYLOGISTIC procedures in SAS version 9.4 (SAS Institute Inc., Cary, NC, USA). The *p*-values <0.05 were considered to indicate statistical significance.

RESULTS

Table 1 shows the general characteristics of the 38 126 subjects according to whether the subjects were family members of a cancer patient (family members of a cancer patient: 1590; subjects without a cancer patient in the family: 36 536). The percentages were weighted to be representative of the national population. The proportion of males who were members of a family with a cancer patient was higher than the proportion of females by approximately 15.2%, and the proportion of females in families without cancer patients was slightly predominant. Age distribution, family income, educational level, and marital status differed between the groups, with no

Table 1. General characteristics of the study population according to the presence of a cancer patient within the family in the Korea National Health and Nutrition Examination Survey, 2007-2014 (n=38 126)

Variables	Family member of a cancer patient		
	No (n=36 536)	Yes (n=1590)	*p*-value
Sex			<0.001
Male	15 997 (50.5)	811 (57.6)	
Female	20 539 (49.5)	779 (42.4)	
Age (y)			<0.001
19-29	4797 (20.2)	280 (29.0)	
30-39	7771 (22.8)	226 (16.5)	
40-49	7561 (23.5)	170 (13.6)	
50-59	6690 (17.3)	288 (17.5)	
60-69	5508 (9.5)	340 (12.7)	
≥70	4209 (6.7)	286 (10.6)	
Family income			0.005
First quartile (low)	5809 (12.8)	326 (15.5)	
Second quartile	9439 (26.4)	411 (27.6)	
Third quartile	10 628 (30.7)	383 (24.6)	
Fourth quartile (high)	10 660 (30.2)	470 (32.3)	
Educational level			0.001
Elementary school	8104 (15.6)	432 (18.3)	
Middle school	3909 (9.7)	191 (9.9)	
High school	13 208 (41.0)	475 (34.9)	
College school	11 315 (33.7)	492 (36.9)	
No. of family members			0.31
2	12 535 (30.1)	584 (27.5)	
3	9694 (29.0)	404 (29.2)	
≥4	14 307 (40.9)	602 (43.3)	
Marital status			<0.001
Married	28 727 (73.0)	1151 (60.9)	
Separated or divorced	2780 (6.3)	71 (3.9)	
Single	5029 (20.7)	368 (35.2)	
Job status			0.09
Employed	22 404 (65.3)	947 (62.8)	
Unemployed	14 132 (34.7)	643 (37.2)	
Self-rated health			0.63
Good	13 363 (37.4)	550 (37.2)	
Common	16 253 (46.1)	712 (45.2)	
Bad	6920 (16.5)	328 (17.6)	
Underlying chronic disease[1]			0.008
No	25 781 (77.1)	1002 (74.1)	
Yes	10 755 (22.9)	588 (25.9)	
Study year			0.04
2007	2323 (6.5)	62 (4.0)	
2008	5421 (13.3)	210 (11.2)	
2009	6120 (13.8)	251 (13.0)	

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Table 1. Continued from the previous page

Variables	Family member of a cancer patient		
	No (n=36 536)	Yes (n=1590)	*p*-value
2010	5151 (13.7)	240 (14.4)	
2011	4881 (13.7)	234 (15.3)	
2012	4459 (13.3)	209 (13.9)	
2013	4293 (13.3)	179 (12.5)	
2014	3888 (12.4)	205 (15.6)	
Diagnosed with depression			0.03
No	35 203 (96.7)	1512 (95.4)	
Yes	1333 (3.3)	78 (4.6)	
Weighted n	30 087 761	1 206 633	

Values are presented as number (weighted %).
[1]Hypertension, diabetes, stroke, heart disease, arthritis, and chronic renal disease.

statistically significant trends. No significant differences in the number of family member or job status were found between the 2 groups. The prevalence of chronic diseases was slightly higher in the family members of cancer patients (22.9 vs. 25.9%)

Table 2 shows the results for all variables adjusted for in the multivariate logistic regression analysis. The family members of cancer patients had higher odds of having been diagnosed with depression than those who did not have cancer patients in the family (OR,1.56; 95% CI, 1.12 to 2.17; *p*=0.009). When stratified by sex, only female family members (OR, 1.59; 95% CI, 1.09 to 2.31; *p*=0.02) of cancer patients had increased odds of having been diagnosed with depression. This relationship was not significant in males (OR, 1.52; 95% CI, 0.83 to 2.80; *p*=0.18). Based on the results of all adjusted variables, females who did not complete college had significantly higher odds of having been diagnosed with depression than those who graduated from university (OR for high school level, 1.61; 95% CI, 1.29 to 2.02; *p*<0.001), as was the case for females who were not employed (OR, 1.27; 95% CI, 1.09 to 1.48; *p*=0.003) in comparison to those who were employed. When females had a small number of family members (OR for 2 family members, 1.29; 95% CI, 1.05 to 1.58; *p*=0.01) or were separated/divorced (OR, 1.48; 95% CI, 1.18 to 1.85; *p*=0.001), their odds of having been diagnosed with depression were significantly increased. No statistically significant association with the odds of having been diagnosed with depression was found with income and comorbidities.

Table 3 shows the associations between being a family member of a cancer patient and having been diagnosed with depression by family income, educational level, and the number of family members. Females with the highest family income had the highest odds of having been diagnosed with depression (OR, 2.30; 95% CI, 1.10 to 4.81; *p*<0.05) and females within a 2-person family had the highest risk of having been diagnosed with depression (OR, 2.01; 95% CI, 1.18 to 3.42; *p*<0.05).

The Table S1 and S2 present further analyses of the effects of the cancer-related characteristics of cancer patients both in the study subjects as a whole and only in the family members of cancer patients. The highest odds of having been diagnosed with depression were found in family members of cancer patients more than 5 years after the diagnosis, but this trend was not statistically significant. The results were similar for various types of cancer.

DISCUSSION

This research, utilizing data from a nationwide survey in Korea, compared the prevalence of doctor-diagnosed depression in people with and without cancer patients in their families. In the present study, we found that the family members of people with cancer had a higher risk of having been diagnosed with depression than those who did not have cancer patients in their family.

Psycho-emotional disorders such as depression or anxiety have been reported to be typical problems for the family members of cancer patients. Family members follow the course of the disease, suffering comparable or even greater distress than the patients [13,20]. Previous studies reported that depression in the family members of cancer patients was associated with factors such as caregiving stress, patient symptoms, sleep loss, and caregiving burden [18,21-24]. In addition to those factors, several studies reported that depression in caregivers was related to the prediction of depression using the integrated QoL [25].

Large-scale domestic studies of the family members of cancer patients have used the same KNHANES 2007-2009 surveys and the 2012 Korea Community Health Survey [26,27]. Lim et al. [26] analyzed 565 family members of cancer patients with a control group constructed using 1:4 matching, but in the multivariate analyses, no significant results were found for any psychosocial impacts. Han [27] studied 8585 cases with 1:1 matching of controls, and found that the family members of cancer survivors had more depressive symptoms than the

Table 2. Multiple logistic regression analysis of the presence of diagnosed depression by sex

Variables	Total (n=38 126)		Male (n=16 808)		Female (n=21 318)	
	aOR (95% CI)	*p*-value	aOR (95% CI)	*p*-value	aOR (95% CI)	*p*-value
Family member of a cancer patient						
No	1.00 (reference)		1.00 (reference)		1.00 (reference)	
Yes	1.56 (1.12, 2.17)	0.009	1.52 (0.83, 2.80)	0.18	1.59 (1.09, 2.31)	0.02
Sex						
Male	1.00 (reference)					
Female	2.53 (2.14, 3.00)	<0.001				
Age (y)						
19-29	1.00 (reference)		1.00 (reference)		1.00 (reference)	
30-39	1.21 (0.83, 1.76)	0.32	1.36 (0.70, 2.66)	0.37	1.09 (0.71, 1.66)	0.70
40-49	1.27 (0.85, 1.90)	0.25	2.07 (1.05, 4.07)	0.03	1.03 (0.66, 1.62)	0.89
50-59	1.35 (0.87, 2.09)	0.18	2.73 (1.28, 5.85)	0.01	1.06 (0.66, 1.71)	0.82
60-69	0.97 (0.61, 1.55)	0.90	1.97 (0.84, 4.65)	0.12	0.80 (0.48, 1.34)	0.39
≥70	0.71 (0.43, 1.17)	0.18	1.59 (0.65, 3.90)	0.31	0.58 (0.33, 1.03)	0.06
p for trend		<0.001		0.55		0.03
Family income						
First quartile (low)	1.12 (0.89, 1.43)	0.33	1.04 (0.63, 1.72)	0.87	1.12 (0.86, 1.46)	0.40
Second quartile	1.04 (0.84, 1.27)	0.74	0.89 (0.58, 1.36)	0.58	1.07 (0.86, 1.35)	0.54
Third quartile	0.85 (0.69, 1.04)	0.11	1.02 (0.67, 1.54)	0.94	0.79 (0.63, 0.99)	0.04
Fourth quartile (high)	1.00 (reference)		1.00 (reference)		1.00 (reference)	
p for trend		<0.001		0.07		<0.001
Educational level						
Elementary school	1.79 (1.33, 2.40)	<0.001	1.83 (1.09, 3.06)	0.02	1.75 (1.24, 2.48)	0.001
Middle school	1.59 (1.20, 2.13)	0.002	1.09 (0.61, 1.93)	0.77	1.78 (1.27, 2.49)	0.001
High school	1.48 (1.22, 1.79)	<0.001	1.08 (0.76, 1.54)	0.66	1.61 (1.29, 2.02)	<0.001
College school	1.00 (reference)		1.00 (reference)		1.00 (reference)	
p for trend		<0.001		<0.001		0.003
No. of family members						
2	1.16 (0.96, 1.40)	0.12	0.73 (0.48, 1.11)	0.14	1.29 (1.05, 1.58)	0.01
3	1.22 (1.01, 1.48)	0.04	1.23 (0.83, 1.83)	0.30	1.18 (0.96, 1.45)	0.12
≥4	1.00 (reference)		1.00 (reference)		1.00 (reference)	
Marital status						
Married	1.00 (reference)		1.00 (reference)		1.00 (reference)	
Separated or divorced	1.47 (1.19, 1.83)	0.001	1.61 (0.76, 3.42)	0.21	1.48 (1.18, 1.85)	0.001
Single	1.08 (0.74, 1.56)	0.70	2.55 (1.49, 4.38)	0.001	0.69 (0.44, 1.06)	0.09
Job status						
Employed	1.00 (reference)		1.00 (reference)		1.00 (reference)	
Unemployed	1.46 (1.27, 1.69)	<0.001	1.98 (1.36, 2.88)	<0.001	1.27 (1.09, 1.48)	0.003
Self-rated health						
Good	1.00 (reference)		1.00 (reference)		1.00 (reference)	
Usual	1.88 (1.56, 2.26)	<0.001	1.86 (1.27, 2.75)	0.002	1.90 (1.54, 2.35)	<0.001
Bad	4.07 (3.34, 4.96)	<0.001	3.99 (2.58, 6.15)	<0.001	4.06 (3.23, 5.10)	<0.001
Underlying chronic disease[1]						
No	1.00 (reference)		1.00 (reference)		1.00 (reference)	
Yes	1.19 (0.99, 1.43)	0.06	1.30 (0.87, 1.93)	0.20	1.17 (0.96, 1.42)	0.13

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Table 2. Continued from the previous page

Variables	Total (n=38 126)		Male (n=16 808)		Female (n=21 318)	
	aOR (95% CI)	*p*-value	aOR (95% CI)	*p*-value	aOR (95% CI)	*p*-value
Study year						
2007	1.00 (reference)		1.00 (reference)		1.00 (reference)	
2008	1.18 (0.83, 1.69)	0.35	0.80 (0.39, 1.62)	0.53	1.38 (0.92, 2.07)	0.13
2009	1.38 (0.97, 1.96)	0.07	1.16 (0.61, 2.20)	0.65	1.48 (0.99, 2.22)	0.06
2010	1.52 (1.06, 2.18)	0.02	1.23 (0.62, 2.43)	0.55	1.67 (1.09, 2.54)	0.02
2011	1.88 (1.32, 2.67)	0.001	1.35 (0.70, 2.62)	0.37	2.13 (1.41, 3.20)	<0.001
2012	1.66 (1.16, 2.38)	0.006	1.25 (0.62, 2.55)	0.53	1.85 (1.23, 2.79)	0.003
2013	1.56 (1.10, 2.22)	0.01	1.41 (0.72, 2.77)	0.32	1.63 (1.08, 2.46)	0.02
2014	2.28 (1.58, 3.27)	<0.001	1.75 (0.88, 3.49)	0.11	2.51 (1.66, 3.79)	<0.001
p for trend		<0.001		0.005		0.001

aOR, adjusted odds ratio; CI, confidence interval.
[1]Hypertension, diabetes mellitus, stroke, heart disease, arthritis, and chronic renal disease.

Table 3. Subgroup[1] analysis of the association of being a family member of a cancer patient with the presence of diagnosed depression by socioeconomic variables

Variables	Male (n=16 808)	Female (n=21 318)
Family income		
First quartile (low)	2.38 (0.84, 6.77)	0.96 (0.47, 1.96)
Second quartile	0.43 (0.11, 1.73)	2.10 (1.12, 3.95)*
Third quartile	1.91 (0.59, 6.20)	0.89 (0.45, 1.74)
Fourth quartile (high)	1.66 (0.62, 4.48)	2.30 (1.10, 4.81)*
Educational level		
Elementary school	3.55 (1.54, 8.20)*	1.54 (0.99, 2.41)
Middle school	<0.01 (<0.01, <0.01)*	0.72 (0.29, 1.79)
High school	0.51 (0.16, 1.65)	1.68 (0.89, 3.18)
College school	2.04 (0.75, 5.58)	1.56 (0.52, 4.67)
No. of family members		
2	1.79 (0.55, 5.86)	2.01 (1.18, 3.42)*
3	1.57 (0.59, 4.16)	1.46 (0.58, 3.68)
≥4	1.08 (0.44, 2.67)	1.19 (0.65, 2.20)

Values are presented as adjusted odds ratio (95% confidence interval).
[1]Each set of subgroup data was stratified by the selected variables, and adjusted for other variables (age group, family income, educational level, number of family members, marital status, job status, self-rated health, underlying chronic disease, and study year).
*$p<0.05$.

controls (stress: adjusted OR [aOR], 1.08; depressive symptoms: aOR, 1.31). Although our study used somewhat different covariates, our results were generally consistent with those of previous studies, and we also demonstrated for the first time a sex effect on this relationship.

The prevalence of diagnosed depression was 3.33% among all subjects, corresponding to a prevalence of 4.60% among the family members of cancer patients was 4.60% and a prev-

alence of 3.28% among their counterparts. According to the 2011 Epidemiological Survey of Mental Disorders in Korea, the prevalence of having experienced depression was 6.7% (male: 4.8%; female: 9.1%) [28]. Compared to previous studies investigating depression in the FCs of cancer patients, a relatively low prevalence was found in this study (Grunfeld et al. [29]: 11% for males and 12% for females; Yang et al. [30]: 63.5%; Chung et al. [31]: 27.5%; Braun et al. [24]: 38.9%). Some studies have found that the rate of depression in families was over 80% in self-response questionnaires [15,32]. Since the subjects of this study encompassed the entire family, not only caregivers, the prevalence was not remarkably low in comparison to the rates reported by previous studies.

After stratifying the subjects by gender, no statistically significant association remained between the presence of cancer patients in the family and diagnosed depression in males. However, a statistically significant relationship was found in females. This result is congruent with previous studies that reported differences in the caregiver burden based on sex, as the burden of caregiver duties in females may be greater than in males [33]. However, some studies reported that the difference in the caregiver's burden depending on sex was not statistically significant. Therefore, the differences in these results may be influenced by cultural differences in sex roles within the family [34]. According to the recent report of Kim et al. [35], the traditional caregivers in Korea are females—daughters, daughters-in-law and spouses—and they continue to play an important caregiving role despite the introduction of public long-term care insurance [35].

Although the modifying effect of household income and

educational level on the association between being a family member of a cancer patient and depression was not significant, differences were observed in the OR according to the number of family members. The OR for depression became stronger as the number of family members decreased. This tendency suggests that individuals in 2-person households are more sensitive to disease within the family. Even when controlling for marital status, this trend appears to have been due to the fear of becoming isolated after bereavement and the pressure of caregiving responsibilities. Previous studies have not analyzed respondents according to the number of household members; given recent findings regarding depression in single-person households, this issue requires special attention [36].

The present study has several limitations. First, this study did not consider certain variables related to cancer patients, such as the type of cancer and the seriousness and duration of the disease. In addition, the variable of the caregiver's burden was not measured or adjusted for. The results may have differed depending on those variables. If the results were adjusted for patient-specific variables or the caregiver's burden, the ORs for having been diagnosed with depression might have been different. Therefore, the results in this study might have been influenced by the non-inclusion of several variables. In an additional analysis, when we added the variables of cancer type and period from diagnosis, the OR of depression in the family members of cancer patients moved toward null (Table S1). This tendency is likely to require further study with a different design.

A second limitation is that depression might depend on the relationship between the cancer patient and the family members. This study assumed that all family members of cancer patients have the same burden. Although this study defined family members as only those who lived together during the survey time, cohabitation or contributions to the patient's care may change if cancer patients remain alive for a long time. Nevertheless, our results can still be meaningfully interpreted as suggesting that diagnosed depression may be related to simply being a family member of a cancer patient.

A third limitation is that we analyzed the total population, not only the family members of cancer patients, and the results showed risk factors for depression after adjusting for the family member's status. Therefore, we cannot be sure which risk factors are themselves associated with depression. In our data, the total number of family members of a cancer patient was insufficient for an analysis of this issue (Table S2). In future studies, it will be necessary to analyze the results using only the family members to evaluate the risk factors associated with being a caregiver.

Despite the aforementioned limitations, this study has strengths. First, we used nationally representative data and a large number of subjects. In summary, the results of this study show an association between having been diagnosed with depression and being a family member of a cancer patient in Korea. In addition, by defining depression based on a physician's diagnosis, rather than by measuring the extent of depression symptoms, we investigated the influence of the variables that incur actual medical costs to society from families with cancer patients.

This study found that the family members of cancer patients were more likely to have been diagnosed with depression. We need to invest more effort into diagnosing and managing depression in family members of cancer patients. This will have an impact both on their QoL and on the well-being of patients, as supporters and caregivers play an instrumental role in helping patients manage their illness.

CONFLICT OF INTEREST

The authors have no conflicts of interest associated with the material presented in this paper.

SUPPLEMENTAL MAERIALS

Supplemental Material 1: Table S1 is available at https://www.jpmph.org/.
Supplemental Material 2: Table S2 is available at https://www.jpmph.org/.

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