

Prevalence of anxiety and depression and their risk factors in Chinese cancer patients

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Abstract

Purpose This paper aimed to obtain information on the levels of anxiety and depression among cancer patients in China. The factors influencing these psychological problems were also analyzed.

Methods A total of 1,217 cancer patients were interviewed, and each participant was asked to complete a self-administered questionnaire. The anxiety status, depression status, disease stage, tumor site, pain status, and performance status of the patients during the week prior to the interview were assessed. **Results** The anxiety and depression prevalence rates were 6.49 and 66.72 %, respectively. The prevalence rates of depression were 60.62 % for head and neck cancer, 77.19 % for lung cancer, 57.9 % for breast cancer, 75.81 % for esophagus cancer, 63.40 % for stomach cancer, 68.42 % for liver cancer, 54.37 % for colorectal cancer, and 71.13 % for cervix cancer. The factors influencing depression of patients were performance status ($P < 0.0001$), pain ($P = 0.0003$), age ($P < 0.0001$), and education level ($P < 0.0001$). The risk factors of anxiety were performance status ($P = 0.0007$), age ($P < 0.0001$), and gender ($P < 0.0001$).

Conclusions Depression was a more important psychological problem than anxiety in cancer patients. Compared with 3.8 % of the prevalence of depression in normal population, depression level was high among Chinese cancer patients. Patients with lung, esophagus, and cervix cancers were the high-risk groups for depression. Poor performance status, pain, old age,

and low-level education were the predicting factors for depression.

Keywords Anxiety · Depression · Performance status · Pain · Cancer patient

Introduction

Cancer has remained a disease equated to hopelessness, pain, fear, and death despite recent advances in cancer treatment. Clinic physicians and nurses in China have always put much attention on some aspects of tumor treatments, such as surgical and chemotherapy/radiotherapy, but the role of psychological factors in tumor treatment was neglected [1].

Most cancer patients may suffer from psychological problems in varying degrees [2]. Psychological distress may be part of a reaction to the cancer diagnosis [3], but in many patients, it will persist, causing an added burden during treatment and leading to more difficulty with general management and symptom control, increased length of hospital stay [4], and decreased compliance with treatment [5]. Distress is also an important predictor of fatigue and quality of life (QOL) [6]. Moreover, the presence of depression or anxiety in the patient is believed to influence cancer survival [7, 8]. Data from several studies have indicated that poor psychological status may influence a patient's immune status and thereby affect the illness duration [9, 10]; untreated depression results in significant morbidity and mortality [11]. Therefore, having a good understanding on the prevalence and risk factors of psychological problems is advantageous in identifying high-risk patients. Preventive treatments suitable for these patients can then be organized, which may be beneficial in improving the outcome of tumor treatment and QOL of the cancer patients.

Anxiety and depression are the most common psychological problems among cancer patients [12–14]. The reported

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prevalence of anxiety and depression in cancer patients ranges from 25 to 54 % [11, 13, 15–20]. However, information on the psychological distress in Chinese cancer patients is limited. A study involving 203 Taiwanese cancer patients has reported that the prevalence of anxiety and depression was 11.8 and 20 %, respectively [21]. Another study conducted among 218 breast cancer patients in Hong Kong has reported that the percentages of patients suffering from anxiety and depression were 21.1 and 34.4 %, respectively [14]. Exploring the prevalence of anxiety and depression among Chinese cancer patients is necessary for understanding the psychological status of these patients during treatment.

There are wide variations in prevalence of psychological distress for various cancer sites [22]. Depression is highly associated with oropharyngeal (22–57 %), pancreatic (33–50 %), breast (1.5–46 %), and lung (11–44 %) cancers [11]. A less high prevalence of depression is reported in patients with other cancers, such as colon (13–25 %) [23], gynecological (12–23 %) [24], and lymphoma (8–19 %) [25].

The main factors influencing the levels of psychological distress are patients' sociodemographic characteristics (e.g., age, gender, and education level) [26], social support [27], and disease-related factors [28–30]. The relationships between psychological problems and disease-related factors, such as disease stage, pain, and performance status, have been reported by various studies [31–34]. However, most of these studies used small samples, and their conclusions were inconsistent [15, 32, 33].

In the current study, an epidemiological investigation was undertaken to describe the psychological status of Chinese cancer patients and analyze the related factors using a large population of Chinese cancer patients. The prevalence of anxiety and depression among cancer patients with various tumor sites was compared. Disease-related factors associated with anxiety and depression, including disease stage, pain, and performance status, were also analyzed.

Patients and methods

Participants

The study subjects were cancer patients admitted in Fujian Tumor Hospital between December 2010 and June 2012. Eligible patients were (1) in the second week after operation, (2) without mental or psychological disease history, (3) aged 18 years or older, and (4) literate. A total of 1,217 eligible participants were included in our sample, and all participants provided their written consent. The study was approved by the relevant institutional review boards for human research of Fujian Medical University.

Procedure

The participants were interviewed 14 days postoperation. Trained graduate students from Fujian Medical University introduced the study purpose to each patient. Upon obtaining consent, the patient was asked to complete a self-administered questionnaire including demographic characteristics, anxiety status, depression status, tumor site, pain status, and performance status. Information about the patients' disease stage was obtained from their medical records.

Questionnaire

The Hospital Anxiety and Depression Scale (HADS) [35] was used to evaluate anxiety and depression status. HADS is a 14-item (seven for anxiety subscale and seven for depression subscale) questionnaire designed for physically ill patients. Each item is rated on a 0 to 3 scale, yielding a total score ranging from 0 to 21 for each subscale. The higher the total score, the higher is the level of anxiety or depression. A subscale score of 8 to 10 indicates a doubtful case, whereas a subscale score larger than 11 suggests a definite case [36]. In this study, a subscale score ranging from 11 to 21 for both anxiety and depression indicated that the patient was suffering from anxiety and depression. The validity of the HADS Chinese version has been confirmed in previous studies [37]. In our sample, the reliability estimates of HADS, Cronbach's α , were 0.81 for anxiety and 0.83 for depression.

The Eastern Cooperative Oncology Group Scale (ECOG) [35] was used to measure the patient's performance status. This scale captures patient-derived functional status data on a scale of 0 to 4. An ECOG score of 2 to 4 indicates a poor performance status, whereas a score of 0 to 1 indicates a good performance status. Researchers have confirmed the validity of the ECOG Chinese version in assessing the performance status of Chinese cancer patients [38].

Pain intensity was measured using a 0 to 10 numerical rating scale, with 0 indicating “no pain” and 10 for “extremely painful.”

The social support was measured by two items: (1) When encountering worries, would you like to pour out to somebody? (using a 1 to 4 numerical rating scale: 1 never pouring out my worries to anyone, 2 only pouring out my worries to my parents or spouse, 3 when my relatives and friends asking me, I will pour out my worries to them, and 4 talking my worries to others on my own initiative) and (2) When encountering difficulties, would you like to ask the help from others? (using a 1 to 4 numerical rating scale: 1 never, 2 occasionally, 3 sometimes, and 4 always). Each patient's social support status was assessed by the sum of scores of these two items. The social support score ranges from 2 to 8. A high score indicates a good social support.

Statistical analysis

The levels of anxiety and depression among cancer patients were represented in percentages and their 95 % confidence intervals (95 % CI), and χ^2 test was used to identify potential factors influencing the prevalence of anxiety and depression. Multiple linear regressions were applied to determine the independent effect of each factor associated with these psychological problems after other factors were controlled. The significance level was 0.05.

Data were analyzed using SAS version 9.0 software (SAS Institute, Inc., Cary, NC).

Results

Patients' background

During the study period, 1,474 cancer survivors were eligible, among them 214 did not consent to accept our survey and 43 did not complete the questionnaire. Ultimately, a total of 1,217 cancer patients consisting of 727 (59.74 %) males and 490 (40.26 %) females were enrolled in this study. The mean age (standard deviation) for male and female subjects was 52.73 (13.51) and 48.82 (12.07) years, respectively. The mean age of all subjects was 51.24 (13.06) years. A total of 418 (34.35 %) patients had less than 6 years of education. The numbers of subjects per tumor site were as follows: head and neck, 226 (18.57 %); lung, 171 (14.05 %); breast, 76 (6.24 %); esophagus, 124 (10.19 %); stomach, 205 (16.84 %); liver, 57 (4.68 %); colorectal, 103 (8.46 %); and cervical, 142 (11.67 %). The proportions of patients with disease stages I, II, III, and IV were 10.02, 25.39, 34.51, and 30.07 %, respectively.

Psychological status during 2-week postoperation

Seventy-nine patients obtained an anxiety subscale score higher than 11, and 812 patients showed a depression subscale score higher than 11. The prevalence of anxiety and depression was 6.49 % (95 % CI 5.1–7.87 %) and 66.72 % (95 % CI 64.07–69.37 %), respectively. Depression was the main psychological problem in cancer patients because its prevalence was markedly higher than that of anxiety. The prevalence of anxiety and depression among cancer patients by tumor site is listed in Table 1. The prevalence of both anxiety and depression in the various tumor sites was statistically different (Fisher's exact probability: $P < 0.0001$ for anxiety and χ^2 test: $P < 0.0001$ for depression). Depression was most prevalent in lung cancer patients, followed by those with esophagus and cervical cancers. With 95 % confidence interval of the prevalence of depression, Table 1 shows that lung cancer patients had a higher prevalence than those with other tumors (Fisher's $P < 0.05$), except those with esophagus, liver, and cervical

cancers. Compared with patients with other tumors, stomach cancer patients had the highest prevalence of anxiety (Fisher's $P < 0.05$).

Disease-related factors related to anxiety and depression

The associations among disease-related factors, anxiety, and depression were examined separately (Table 2). The effects of age, gender, and education level on anxiety and depression were also estimated. The χ^2 tests showed that patients 60 years of age and above had significantly higher levels of anxiety and depression than patients below 60 years of age ($P < 0.001$ and $P = 0.034$, respectively). In addition, females were more depressed ($P = 0.008$) but less anxious than males ($P = 0.020$). Patients with low-level education had a higher prevalence of depression than patients with over 6 years of education ($P < 0.001$). Results from the χ^2 tests also indicated that disease stage influenced neither anxiety ($P = 0.258$) nor depression ($P = 0.197$), whereas pain and performance status of the patients were associated with both anxiety and depression ($P < 0.001$). Because information about patients' disease stage was obtained from their medical records, most of the patients did not know their disease stages, which may explain that depression was not influenced by disease stage.

Multivariate analysis of influencing factors on anxiety and depression

Multivariate linear regression was used to examine the independent effects of disease stage, pain, and performance status on patients' anxiety and depression status after controlling the tumor site, age, gender, education level, and social support score. At $\alpha = 0.05$ significance level, disease-related factors influencing depression were performance status (partial regression coefficient $\beta = 2.06$, $P < 0.0001$) and pain ($\beta = 1.33$, $P = 0.0003$). In addition, age ($\beta = 0.071$) and education level ($\beta = -0.814$) were also associated with depression ($P < 0.0001$). The risk factors of anxiety were performance status ($\beta = 0.873$, $P = 0.0007$), age ($\beta = 0.440$, $P < 0.0001$), and gender ($\beta = 10.178$, $P < 0.0001$).

Discussion

This study aimed to acquire the prevalence of anxiety and depression in patients with various tumor sites and to assess the risk factors of anxiety and depression. The prevalence of anxiety and depression for the 1,217 patients was 6.49 and 66.72 %, respectively. The levels of anxiety and depression differ with the tumor sites. Lung, esophagus, and cervix cancer patients were the high-risk groups for depression, whereas stomach cancer patients were the high-risk group for anxiety. Poor performance status, pain, old age, and low-level education

Table 1 Prevalence of anxiety and depression among cancer patients by tumor site

Tumor Site	Number	Anxiety			Depression		
		Case	Prevalence (%)	95 % CI ^a (%)	Case	Prevalence (%)	95 % CI ^b (%)
Head and neck	226	3	1.33	0.26–3.89	137	60.62	54.25–66.99
Lung	171	4	2.34	0.58–5.96	132	77.19	70.90–83.48
Breast	76	1	1.32	0.13–7.37	44	57.90	46.80–69.00
Esophagus	124	1	0.81	0.08–4.52	94	75.81	68.27–83.35
Stomach	205	62	30.24	23.95–36.52	130	63.40	56.81–69.99
Liver	57	1	1.75	0.17–9.82	39	68.42	56.35–80.49
Colorectal	103	3	2.91	0.58–8.54	56	54.37	44.75–63.99
Cervix	142	2	1.41	0.14–5.07	101	71.13	63.68–78.58
Others	339	2	0.59	0.59–2.12	69	20.35	16.06–24.64

^a The 95 % confidence interval of the prevalence of anxiety

^b The 95 % confidence interval of the prevalence of depression

were the risk factors for depression, whereas poor performance status, old age, and female gender were the predicting factors for anxiety.

Some researchers have suggested that the level of anxiety and depression among cancer patients does not differ significantly from that of the normal population [12, 39]. A study

conducted by a Chinese researcher has suggested that the prevalence of anxiety and depression among normal population in China was 6.4 and 3.8 %, respectively [40]. In our study, the prevalence of depression was markedly higher than that in the normal population, whereas the prevalence of anxiety was similar to that of the normal population.

Table 2 Associations among potential factors, anxiety, and depression in cancer patients

Factor	Number	Anxiety			Depression		
		Number of cases	Prevalence (%)	<i>P</i> value	Number of case	Prevalence (%)	<i>P</i> value
Age				<0.001			0.034
<50	509	17	3.34		319	62.67	
50–	391	22	5.63		269	68.80	
60–	317	40	12.62		224	70.66	
Gender				0.020			0.008
Male	727	57	7.84		463	63.69	
Female	490	22	4.49		349	71.22	
Education level				0.482			<0.001
≤6 years	418	30	7.18		318	76.07	
>6 years	799	49	6.13		494	61.83	
Disease stage				0.258			0.197
I	122	9	7.38		75	61.47	
II	309	14	4.53		196	63.43	
III	420	34	8.09		291	69.28	
IV	366	22	6.01		250	68.31	
Pain				<0.001			<0.001
No	1,066	15	1.41		696	65.29	
Yes	151	64	42.38		116	76.82	
Performance status				<0.001			<0.001
Good	479	8	1.67		260	54.28	
Poor	738	71	9.62		552	74.80	

A meta-analysis revealed that the reported percentages of patients with anxiety range from 0.9 to 49 % [16]. Employing the same instrument used in the current study, Chen reported an 11.8 % prevalence of anxiety among 203 Taiwanese hospitalized cancer patients [21]. So used HADS Chinese version and reported a 21.1 % prevalence of anxiety in 218 breast cancer patients in Hong Kong [14]. Compared with these previous studies, our sample showed a lower prevalence of anxiety. One possible reason for the contrasting results might be the difference in the inclusion criteria and heterogeneity of the samples. In So's study, the cutoff score of anxiety subscale in HADS was 7. A lower specificity may exist that uses a cutoff score of 7 than a cutoff score of 11 [36].

The percentages of patients with depression as reported by various studies ranged from 25 to 54 % [11, 14–16, 18]. The variation in the prevalence of depression may have been caused by the difference in measurement tools and heterogeneity of the samples. So reported that the prevalence of depression among 218 Chinese breast cancer patients recruited from the outpatient sections of the hospitals was 34.4 % [14]. In our study, the prevalence of depression was remarkably higher than that obtained by So. One possible reason for our higher prevalence might be the difference in time of monitoring for psychological status. Patients with different stages exhibit varying risks of suffering from depression [2]. In our sample, depression status of the patients was measured during a short-time postoperation, whereas So's samples were outpatients and midway in their course of chemotherapy. In addition, most of the patients were with III or IV disease stage (65 % of patients) in our study, which may be one of the reasons of the higher prevalence of depression.

The prevalence rates of depression/anxiety may be different in patients with different tumor sites. Some researchers have suggested that the patients with breast and lung cancers have a high risk of depression [11]. In our study, the patients with lung, esophagus, stomach, and cervix cancers have a high risk of depression or anxiety. Stomach, esophagus, and lung cancers are the main cancers in Fujian Province [41]. Incidence and mortality of these diseases are higher than those of other malignant tumors [41]. Because of knowing more information about these tumors, people have more severe fear of these cancers [31]. Besides, the patients with gastric cardia, esophagus, and lung cancers have worse quality of life after surgery than those suffering from other tumors [42], which also may cause a high prevalence of depression/anxiety. Cervical cancer patients also are with high risks of psychological distress [43]. Surgery or radiotherapy may cause some problems, such as loss of fertility, earlier menopause, and sexual disharmony [44, 45]. These problems affect patients' family life, particularly their sexual well-being. Unharmonious family life and poor sexual well-being may decrease women's family contentment and cause their psychological distress [45, 46].

Some researchers have reported that older age was linked with more depressive symptoms in a Chinese population [47]. One possible reason is that older patients have poor abilities to ask for help and to communicate with others. Besides, worrying about too much treatment cost and family financial difficulties may be causes for psychological distress also.

Performance status had a predictive effect on anxiety and depressive symptoms. Patients with poor performance status were inclined to have high levels of anxiety and depression. This result is in agreement with the findings of other investigations [21, 32, 34].

After controlling performance status, age, gender, and tumor site, pain only predicted the severity of depression, but not anxiety, which is consistent with the existing literature [21].

Some researchers have reported the relationship between social support and depression [48, 49]. However, our results did not detect this relationship. In our study, the proportions of the patients with <4, 4–6, and >6 of social support score were 12.41, 62.28, and 25.31 %, respectively. In multiple linear regression analysis, the partial regression coefficients for social support score were not statistically significant ($P=0.183$ for depression and $P=0.282$ for anxiety). Possible reason for our results was that we did not use a standardized scale of social support. The two items used to measure social support in this study were taken from the Social Support Rating Scale (SSRS) of China, and they are actually measuring a person's utilization of support [35].

The limitations of our study must be mentioned. Our study used the cross-sectional design. The prevalence of anxiety and depression only described the psychological status of cancer patients at one point in time, and the prevalence patterns of anxiety and depression during cancer treatments were not evaluated. A more methodologically sound approach is to use a longitudinal design in which the same patient will be assessed on multiple occasions during treatment. Data from longitudinal studies could greatly clarify the natural history of psychological distress in cancer patients. In addition, not using a standardized scale of social support is a deficiency in our study.

Conclusions

This study showed that depression was a more important psychological problem than anxiety in cancer patients. The level of depression is high among Chinese cancer patients during 2-week postoperation. Lung, esophagus, and cervical cancer patients were the high-risk groups for depression. Poor performance status, pain, old age, and low-level education were the predicting factors for depression. Therefore, clinic physicians and nurses should put more attention to the mental health of patients who

have undergone a surgical operation and provide them with timely psychological interventions.

Conflict of interest The authors have no conflicts of interest to declare. This study has no financial relationship with any organization that sponsored the research and authorship. The corresponding author has full control of all primary data and will allow the journal to review the data if requested.

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