The influence of sense of control and cognitive functioning in older cancer patients' depression

Kyriaki Mystakidou*, Eleni Tsilika, Efi Parpa and Antonis Galanos
Pain Relief and Palliative Care Unit, Department of Radiology, Areteion Hospital, School of Medicine, Kapodistrian University of Athens, Athens, Greece

*Correspondence to:
Pain Relief and Palliative Care
Unit, Department of Radiology,
Areteion Hospital, School of
Medicine, Kapodistrian University
of Athens, 27 Korinthias St., 115
26 Athens, Greece. E-mail:
mistakidou@yahoo.com

Abstract

Objective: This study aimed to evaluate the associations between depression, sense of control, and cognitive functioning, as well as the predictive power of sense of control and cognitive functioning in older cancer patients' depression.

Methods: Eighty-six cancer patients were referred to a palliative care unit. They completed the 15-item Geriatric Depression Scale, the Cancer Locus of Control, and the Mini Mental State Examination questionnaires.

Results: Higher perceived control over the 'course of illness' was associated with higher levels of depressive symptoms ($p < 0.0005$), whereas lower perceived control over the 'cause of illness' was associated with higher depressive symptoms. The same results were found for 'cause of illness' between non-depressed and depressed patients ($p = 0.001$). Multivariate analysis revealed that whereas an external orientation in 'course of illness' increased the likelihood of depression ($p = 0.002$), an external orientation in 'cause of illness' decreased the likelihood of depression ($p = 0.05$).

Conclusions: Older cancer patients' sense of control orientation over the course of illness and the cause of illness predicted the levels of depressive symptomatology. Copyright © 2014 John Wiley & Sons, Ltd.

Introduction

Mood disorders are of the most common psychiatric conditions seen in older people, worsening preexisting conditions and causing loss of autonomy. The latter has also been found to have a circular relationship with depression, mutually reinforcing each other [1].

Epidemiologic studies describe that by 2020 about 70% of all cancers will be diagnosed in those aged 65 years or older [2]. Depression is highly prevalent both in people with cancer and in older people [3].

Depression complicates the course and treatment of chronic disease [4] and is projected to become the second-leading cause of disability by 2020 [5]. Moreover, depression might affect adherence to medical treatment such as adherence to procedures like radiation therapy [6].

Although recognition of geriatric depression has improved in recent years [7], there are still gaps in knowledge about assessment and diagnosis for particular population groups [8]. It has been reported that older people with cancer are at risk of developing subthreshold forms of depression, meaning depression may go unrecognized and untreated [9]. Given the rapid increases in the number of older people diagnosed with cancer, greater awareness, identification, evaluation, and treatment of depression, this group has gained attention [10].

Studies indicate that the prevalence of clinically diagnosable depression in palliative care settings is approximately 25%, with up to 50% of patients in this setting reporting high levels of depressive symptomatology [11].

Reduced interest in activities and relationships, sleep problems, and fatigue, which characterize depression, tend to foster declines in physical performance [12]. Although chronic medical illnesses have been found to be associated with an increased risk for suicide in older people [13], there is only one study exploring the issue of suicide in aging patients with cancer [13], suggesting that an increasing awareness of the psychiatric effects of the cancer diagnosis as well as assessment and treatment of depression may be important preventive measures.

Patients with chronic illness develop coping strategies, and a previous sense of control experienced when coping with their illness might help them achieve good psychosocial and emotional adjustment [14]. Beliefs about control are part of many theoretical frameworks designed to explain behavior and health outcomes.

The locus of control is one of the personality dimensions, which refers to the beliefs that people's experiences or what happens to them is either a consequence of their behaviors (internal reinforcement) or controlled by external forces (external reinforcement). Having an internal locus of control may manifest itself with the belief that the disease can be kept under control [15]. On the other hand, an external locus of control is the belief that events in one's life are caused by uncontrollable factors such as the environment, other people, or a higher power.

Weiner's early work in the 1970s suggested that orthogonal to the internality–externality dimension, differences should be considered between those who attribute to stable causes and those who attribute to unstable causes [16].

This dimensional theory means that one could attribute outcomes to ability (an internal stable cause), effort (an internal unstable cause), task difficulty (an external stable cause), or luck (an external unstable cause).

The external locus of control has important effects on depression onset but is studied less [25]. Research stating that the external locus of control [17] predicts depression persistence has also been published. The internal locus of control has been associated with better coping and adjustment to chronic diseases [18] and lower disability.

Although the internal health locus of control has the most consistent relationship with health outcomes, the association depends on the time frame of the internal dimension. More specifically, if the internal dimension is perceived as having control in the future, it is related to better adjustment of cancer patients, whereas if it is perceived as the control the patient had in the past, it is related to more distress and worse adjustment [19]. Another argument comes from early work with this construct, which maintains that a strong 'internal' orientation is associated with more positive adaptation to chronic disease when patient control over the illness or treatment is realistic but may be maladaptive when there are impediments to exercising personal control [20].

Therefore, an important question is whether locus-of-control orientation can be shifted or not. Research favorable to this hypothesis is based on the fact that attribution of control is due to significant life experiences and people can face experiences that alter their perception of control [21]. Cvengros *et al.* [18] state that changes in locus orientation can facilitate adaptation in cases of diseases, once internal orientations are more related to self-care and search for more information about one's health conditions. This is particularly interesting in cancer, as the locus-of-control orientation has been associated with conditions that influence quality of life and prognosis [22].

Expert working groups around the world have noted the poor corresponding levels of recognition and treatment of depression in this setting and have identified the need of more effective pathways to treatment and increased provision of care [23]. Although depression is a significant problem among patients receiving palliative care [24], nevertheless, older people have not been specifically investigated in current cancer studies [25].

Therefore, the aims of the present study are as follows: first, to assess the relationship between depression, locus of control, and cognitive condition in older cancer patients receiving palliative care and, second, to investigate the predictive power of locus of control and cognitive function in patients' depressive symptoms.

Methods

Participants

Advanced cancer patients were accrued from February 2012 through July 2012. A sample of 112 consecutive Greek terminally ill cancer patients referred to an outpatient palliative care unit, for pain relief and cancer-related symptoms, was judged eligible to participate in the study. Criteria for inclusion were having histologically confirmed malignancy, stage IV disease, age > 60 years, ability to communicate effectively with healthcare professionals, and written informed consent. Patients were excluded if there was a diagnosis of a psychotic illness or severe cognitive impairment (Mini Mental State Examination (MMSE) < 18). From the 112 patients, 26 (23%) declined to complete the assessment forms and thus were excluded from the study. The final sample consisted of 86 cancer patients. Performance status was measured by the patients' overall physical functioning, as defined by the Eastern Cooperative Oncology Group (ECOG). The hospital's ethics committee approved this study, which was conducted according to the Declaration of Helsinki principles and according to the guidelines for good clinical practice.

Procedure

Patients completed the following self-report measures:

1. The short version of the Geriatric Depression Scale (GDS) containing 15 questions has been used. The total score on the GDS-15 indicates illness severity, although the scale does not assess the severity of specific symptoms [26]. The GDS-15 has been used in various settings [10], including palliative care settings, and has been proven appropriate [27]. The GDS-15 has been validated in Greek (1999) with a Cronbach alpha coefficient of 0.94. The Greek version has revealed four factors: cognitive, affective, and functional factors and a factor reflecting hopelessness and fear for the future. A score of 6/7 was found to be the best cut-off point for diagnosing depression [28].

2. The Cancer Locus of Control scale [29] consists of three subscales: 'control over the course of cancer' (seven items), 'control over the cause of cancer' (seven items), and 'religious control' (three items). Ratings are made on a 4-point scale ranging from 'completely agree' (1) to 'completely disagree' (4). Higher scores mean more external orientation of control. The scale has been validated in a sample of Greek advanced cancer patients [30], showing good psychometric properties and a Cronbach α ranging from 0.713 to 0.786.

3. The MMSE is a brief, quantitative measure of cognitive status in adults. It can be used to screen for cognitive impairment at a given point in time, to follow the course of cognitive changes in an individual over time, and to document an individual's response to treatment. The MMSE assesses orientation, memory, language skills, and visual–spatial perception. A score of ≤18 corresponds to severe cognitive impairment, a score from 19 to 23 corresponds to moderate cognitive

impairment, and a score of ≥24 corresponds to normal cognitive status.

4. The ECOG has the following scoring system: 0 = fully active, able to carry on all pre-disease performance; 1 = restricted in physical strenuous activity but ambulatory and able to carry out work of a light or sedentary nature; 2 = ambulatory and capable of all surface but unable to carry out any work activities, up and about more than 50% of waking hours; 3 = capable of only limited self-care, confined to bed or chair more than 50% of waking hours; and 4 = completely disabled, cannot carry any self-care, totally confined to bed or chair [31]. In the present study, patients with an ECOG score of 0 or 1 are categorized as having 'good' performance status, whereas those with an ECOG score of 2 or 3 are categorized as having 'moderate to poor' performance status.

Statistical analyses

Data were expressed as mean ± standard deviation (SD) for continuous variable and as percentages for categorical data. The Kolmogorov–Smirnov test was utilized for normality analysis of the parameters. Power calculations were not performed.

We determined the association between categorical variables and GDS status (non-depressed vs. depressed) using the chi-square test or Fisher's exact test, whereas the Student *t*-test was used to examine if the continuous variables differed in patients without and patients with GDS.

All the variables, not only those exhibiting a significant relation in the bivariate analysis, were selected for the multivariable analysis. These variables were subjected to logistic regression analysis, establishing the presence of GDS-15 as the outcome variable, and odds ratios and their 95% confidence intervals are presented. The Wald forward elimination method was used to arrive at the final model. Goodness of fit was evaluated using the Hosmer–Lemeshow statistic.

All tests are two-sided, a *p*-value of <0.05 was used to denote statistical significance. All analyses were carried out using the statistical package SPSS v. 16.00 (Statistical Package for the Social Sciences, SPSS Inc., Chicago, IL, USA).

Results

Descriptive

Of all participants, 56% were men, most were educated to primary school level, and the majority was married (94%). Gastrointestinal cancer was diagnosed in 31.4% of the patients, followed by breast and lung (20% each). Fifty-five point eight percent of patients had undergone

chemotherapy. Sixty-one point six percent of the participants had metastasis. In addition, 57% of the patients received strong opioids (Table 1).

The mean score of depression was 8.37 ± 3.76 (ranging from 1 to 14). In the locus-of-control scale, the highest mean score was found in the 'cause of illness' (18.51 ± 3.32; Table 2). Noticeably, 96.5% of the patients had a score of >34. Finally, the mean score on patients' cognitive function was 24.8 (±4.62).

Univariate analysis

The participants in the sample were assigned to two groups on the basis of their depressive score (non-depressed/depressed);

Table 1. Demographic and disease-related patients' characteristics

	N	%
Age		
Mean(SD) 73.1 (79) years	Range (61–91)	
Education		
Primary	39	45.3
High school	35	40.7
University	12	14.0
Gender		
Male	48	55.8
Female	38	44.2
Cancer location		
Urogenital	13	15.1
Breast	17	19.8
Lung	17	19.8
Prostate	12	14.0
Gastrointestinal	27	31.4
Family status		
Married	81	94.2
Unmarried	5	5.8
ECOG score		
0–1	29	33.7
2–3	57	66.3
Surgery		
No	34	39.5
Yes	52	60.5
Metastasis		
No	33	38.4
Yes	53	61.6
Chemotherapy		
No	38	44.2
Yes	48	55.8
Radiotherapy		
No	44	51.2
Yes	42	48.8
Opioids		
Mild	37	43.0
Strong	49	57.0
MMSE		
Normal	63	73.3
Moderate	23	26.7

Table 2. Descriptive statistics

	Mean	SD	Min	Perc25	Median	Perc75	Max
GDS-total score	8.37	3.76	1.00	5.00	9.00	12.00	14.00
Course of illness	15.30	2.47	11.00	13.00	16.00	19.00	24.00
Cause of illness	18.51	3.32	11.00	15.00	19.00	23.00	27.00
Religious control	6.65	1.94	3.00	5.00	7.00	9.00	12.00

the groups were compared with regard to the categorical variables (family status, gender, education, status, surgery, metastasis, chemotherapy, radiotherapy, opioids, and cancer location) and continuous variables (age and locus of control). No correlations were found between patients' categorical variables and depression scores (Table 3). Higher perceived control over the 'course of illness' was associated with higher levels of depressive symptoms ($p < 0.0005$), whereas lower perceived control over the 'cause of illness' was associated with higher depressive symptoms. The same results were found for 'cause of illness' between non-depressed and depressed patients ($p = 0.001$; Table 4).

Multivariate analysis

Multivariate analysis was tested to examine the factors influencing depression (Table 5). All variables were included in the multiple regression as independent

Table 4. Comparisons of continuous variables between non-depressed and depressed patients

	GDS-15		
	Non-depressed (score ≤7) Mean ± SD	Depressed (score >8) Mean ± SD	*p*-value
Age	72.76 ± 8.21	73.38 ± 7.78	0.725
Course of illness	14.16 ± 1.59	16.21 ± 2.67	<0.0005
Cause of illness	19.79 ± 3.35	17.50 ± 2.96	0.001
Religious control	6.61 ± 1.85	6.69 ± 2.96	0.847

Table 5. Multiple logistic regression analysis (forward selection Wald method)

GDS-15 (non-depressed vs depressed) Forward selection Wald method	OR	95%CI	*p*-value
Course of illness	1.63	(1.19–2.24)	0.002
Cause of illness	0.84	(0.71–0.99)	0.050

predictors, not only those found to have statistically significant correlations in the univariate analysis. The forward selection Wald method was used in order to examine which of the independent variables could predict depression (the dependent variable). Results demonstrated that high scores for external attribution of

Table 3. Associations between dichotomous variables and GDS-15 (non-depressed and depressed patients)

		GDS-15			
		Non-depressed (score ≤7)	Depressed (score >8)	OR (95%CI)	*p*-value
Gender	Male	20 (41.7%)	28 (58.3%)	0.79 (0.34–1.87)	0.665
	Female	18 (47.4%)	20 (52.6%)		
Family status	Married	35 (43.2%)	46 (56.8%)	0.51 (0.08–3.20)	0.651
	Unmarried	3 (60.0%)	2 (40.0%)		
Education	Primary	15 (38.5%)	24 (61.5%)	1.00 (ref)	0.281
	High school	19 (54.3%)	16 (45.7%)	0.53 (0.21–1.33)	
	University	4 (33.3%)	8 (66.7%)	1.25 (0.32–4.90)	
ECOG	0–1	14 (48.3%)	15 (51.7%)	1.28 (0.52–3.15)	0.649
	2–3	24 (42.1%)	33 (57.9%)		
Surgery	No	15 (44.1%)	19 (55.9%)	1.00 (0.42–2.40)	1.000
	Yes	23 (44.2%)	29 (55.8%)		
Metastasis	No	18 (54.5%)	15 (45.5%)	1.98 (0.82–4.78)	0.180
	Yes	20 (37.7%)	33 (62.3%)		
Chemotherapy	No	14 (36.8%)	24 (63.2%)	0.58 (0.25–1.40)	0.276
	Yes	24 (50.0%)	24 (50.0%)		
Radiotherapy	No	19 (43.2%)	25 (56.8%)	0.92 (0.39–2.16)	1.000
	Yes	19 (45.2%)	23 (54.8%)		
Opioids	Mild	20 (54.1%)	17 (45.9%)	2.03 (0.85–4.83)	0.129
	Strong	18 (36.7%)	31 (63.3%)		
MMSE	normal	31 (49.2%)	32 (50.8%)	2.21 (0.80–6.12)	0.146
	moderate	7 (30.4%)	16 (69.6%)		
Cancer location	Urogenital	7 (53.8%)	6 (46.2%)	1.00 (ref)	0.861
	Breast	7 (41.2%)	10 (58.8%)	1.67 (0.40–7.15)	
	Lung	6 (35.3%)	11 (64.7%)	2.14 (0.49–9.36)	
	Prostate	5 (41.7%)	7 (58.3%)	1.63 (0.34–7.95)	
	Gastrointestinal	13 (48.1%)	14 (45.9%)	1.26 (0.33–4.730)	

the 'course of illness' and for internal attribution of the 'cause of illness' were predictors of depression. More specifically, an increase of 1 SD in the 'course of illness' increased the likelihood of depression by 64% ($p = 0.002$), whereas an increase of 1 SD in the 'cause of illness' decreased the likelihood of depression by 16% ($p = 0.05$; Table 5).

Discussion

The current study assessed whether depression in older cancer patients was related and predicted by locus of control and cognitive function. More than half of the patients in our sample had depressive symptomatology; the majority of them had normal cognitive functioning, and the vast majority had high external control orientation over both the cause and course of illness.

Univariate analyses showed that depressed patients had a higher course of illness orientation and lower 'cause of illness' compared with non-depressed patients. These results go in line and support Beck's [32] cognitive theory on depression, which emphasizes the importance of adaptive beliefs in mood state.

In contradiction to the literature stating that depression is related to cognitive functioning [33], in the present study, the correlation between cognitive function and depressive symptomatology was not statistically significant. A probable explanation could be the fact that the majority of the patients had normal cognitive functioning.

Similarly to our results, other authors have studied the relationship between locus of control and depression and found that the external locus of control was related to the presence of depression [34]. Moore and Seeney [35] state that not only the losses (history of losses, current and frequent losses with excess mortality in family and kinship networks, loss of function, and social networks and roles) determine the presence of depression but also the way the patient faces them, and this may be critical to the determination of the course of depression. In addition, the course of a chronic disease plays a role in locus-of-control orientation, with eventual changes in patients' orientation.

The multiple regression analysis revealed that external orientation in course of illness is a predictive factor for increased depressive symptomatology, whereas an external orientation in cause of illness is a predictive factor for decreased depressive symptoms. Although the research has shown that people with an external locus of control tend to be more stressed and prone to clinical depression [36], few studies have examined the role of locus of control in geriatric depression. Health-related beliefs become more external with age, whereas beliefs about other goals may not change [37].

The latter finding in the multiple regression possibly means that the patients in this study attribute the cause of their illness to causes outside themselves, therefore experiencing decreased depression. External LOC in cause of illness allows an individual to place the cause of illness outside his or her personal control and responsibility, permitting an individual to avoid a sense of blame or guilt [38]. This is consistent with the belief that when patients attribute the cause of illness to themselves, they have poor emotional status and poor adjustment to the situation [39]. Another interpretation comes from the alienation model [40] that asserts that locus of control has become more external today because of greater individuation. Surprisingly, increases in individualism may lead to greater externality, as it promotes the use of the self-serving bias, which occurs when people attribute good events to themselves and bad events to outside forces. Moreover, it has been argued that an internal locus of control only contributes to positive affect in cancer patients when they are in sufficient physical condition to exert control over their health [41]. Older and younger cancer patients make use of different coping styles and locus-of-control mechanisms [42]. It is assumed that as people age, the emphasis on internal factors affecting outcomes changes toward a more externally based locus of control [43].

These results could lead to interventions designed to identify and address the coping mechanisms, specifically enhancing the external orientation of cancer patients in cause of illness, while encouraging internal orientation in the course of the illness. In patients receiving palliative care treatment, personal control over specific aspects of cancer need to be made available for these patients. A study by Neipp [44] suggested that to give control to patients, it is very important that professionals offer an image of efficacy and accuracy. Tailored counseling is effective with respect to locus of control, whereas structured counseling interventions are considered more effective with respect to depression.

Study limitations

Nevertheless, it should be noted that this study has some limitations. First, a heterogeneous group of patients with cancers at different sites was studied, possibly a study targeted to a specific cancer type (e.g., breast cancer) could have resulted in different outcomes. Second, the present study excluded patients performing poorly on cognitive functioning (MMSE < 18); further studies must be undertaken in older cancer patients with dementia. Third, post-hoc power analysis showed that the sample size did not fulfill the power calculation of >80; therefore, a larger sample size could have strengthened the present findings. Finally, although standardized validated questionnaires were used, limitations inherent in patient self-assessment and cut-off points should be considered.

Conclusions and clinical implications

The present study found that older cancer patients' sense of control over the course of illness and the cause of illness predicted depressive symptomatology, and an external orientation in cause of illness predicted a decreased depression symptomatology.

Therefore, older cancer patients suffering from advanced disease, according to the present results, benefit from an intervention that aims in the enhancement of an external orientation regarding the cause of illness, whereas they benefit from an intervention aimed at the empowerment of internal control in the course of illness. More specifically, externally oriented patients would benefit more (than internals) from receiving advice from healthcare professionals, resulting to a productive role in promoting their health care.

On the other hand, internally oriented cancer patients would benefit more from a psychosocial intervention. Focusing on older cancer patients' locus-of-control orientation could help in both the prevention and recognition of onset of later-life depression [41].

The clinician's ability to establish rapport and elicit a patient's thoughts is essential as he or she assesses history, degree of intent, and quality of internal and external controls. Overall, this study provides evidence that the Cancer Locus of Control may be a useful construct to include in the assessment of palliative care patients' depressive symptomatology.

Conflict of interest

The authors have declared no conflicts of interest.

References

1. Die Trill M. Psychological aspects of depression in cancer patients: an update. *Ann Oncol* 2012;**23** (suppl 10):x302–x305.
2. Balducci L, Extermann M. Cancer and aging. An evolving panorama. *Hematol Oncol Clin North Am* 2000;**14**:1–16.
3. Krishnan KR, Delong M, Kraemer H, *et al*. Comorbidity of depression with other medical diseases in the elderly. *Biol Psychiatry* 2002;**52**:559–588.
4. Chapman DP, Perry GS. Depression as a major component of public health for older adults. 2008;**5**(1). http://www.cdc.gov/pcd/issues/2008/jan/07_0150.htm. Accessed [date]
5. Murray CJ, Lopez AD. Alternative projections of mortality and disability by cause 1990–2020: Global Burden of Disease Study. *Lancet* 1997;**349**:1498–1504.
6. Wesso-Rule N. Vicarious control and quality of life benefits in cancer patients. A research project submitted in partial fulfillment of the requirements for the degree of MA by coursework and Research Report in the field of Clinical Psychology in the Faculty of Humanities University of the Witwatersrand, Johannesburg, December 2009.
7. Llewellyn-Jones R, Snowdon J. Depression in nursing homes: ensuring adequate treatment. *CNS Drugs* 2007;**21**(8):627–640.
8. Chiu E, Ames D, Draper B, Showdon J. In Depressive disorders in the elderly: a review, Maj M, Sartorius N (eds.), *Depressive Disorders*. John Wiley: Chichester, 1999.
9. Young AS, Kla R, Sherbourne CD, Wells KB. The quality of care for depressive and anxiety disorders in the United States. *Arch Gen Psychiatry* 2001;**58**(1):55–61.
10. Weinberger MI, Roth AJ, Nelson CJ. Untangling the complexities of depression diagnosis in older cancer patients. *Oncologist* 2009;**14**(1):60–66.
11. Mitchell AJ, Chan M, Bhatti H, *et al*. Prevalence of depression, anxiety, and adjustment disorder in oncological, haematological, and palliative-care settings: a meta-analysis of 94 interview-based studies. *Lancet Oncol* 2011;**12**:160–174. DOI: 10.1016/S1470-2045(11)70002-X
12. Taqui A, Itrat A, Qidwai W, Qadri Z. Depression in the elderly: does family system play a role? A cross-sectional study. *BMC Psychiatry* 2007;**7**:57. DOI: 10.1186/1471-244X-7-57
13. Llorente MD, Burke M, Gregory GR, *et al*. Prostate cancer: a significant risk factor for late-life suicide. *Am J Geriatr Psychiatry* 2005;**13**:195–201.
14. Neipp MC, López-Roig S, Terol MC, Pastor MA. Changes in control beliefs, emotional status and psychosocial adaptation among women with breast cancer. *Anales de Psicología* 2009;**25**(1):36–43.
15. Baydogan M, Dag I. Prediction of depressiveness by locus of control, learned resourcefulness and sociotropy–autonomy in hemodialysis patients. *Turk J Psychiatr* 2008;**19**(1):19–28.
16. Weiner B (ed.). *Achievement Motivation and Attribution Theory*. General Learning Press: NY, 1974.
17. Beekman AT, Deeg DJ, Geerlings SW, Schoevers RA, Smit JH, van Tilburg W. Emergence and persistence of late life depression: a 3-year follow-up of the Longitudinal Aging Study Amsterdam. *J Affect Disord* 2001;**65**:131–138.
18. Cvengros JA, Christensen AJ, Lawton WJ. Health locus of control and depression in chronic kidney disease: a dynamic perspective. *J Health Psychol* 2005;**10**(5): 677–686.
19. Neipp MC, López-Roig S, Pastor MÁ. Changes in control beliefs in cancer: a literature review. *Anuario de Psicología* 2007;**38**(3):333–355.
20. Christensen AJ, Howren B, Rosenthal GE. Patient and physician beliefs about control over health: association of symmetrical beliefs with medication regimen adherence. *J Gen Intern Med* 2010;**25**(5):397–402.
21. Lefcourt HM. *Locus of Control: Current Trends in Theory and Research*. Lawrence Erlbaum Associates: New Jersey, 1982.
22. Zampieri M, Abib Pedroso Souza E. Locus of control, depression, and quality of life in Parkinson's disease. *J Health Psychol* 2011:1–8. http://hpq.sagepub.com/content/early/2011/03/26/1359105310397220
23. Unutzer J, Shcoenbaum M, Katon WJ, *et al*. Healthcare costs associated with depression in medically ill fee-for-service medicare participants. *J Am Geriatr Soc* 2009;**3**:506–510.
24. Hallford DJ, McCabe MP, Storer S. Intervention for depression among palliative care patients and their families: a study protocol foe evaluation of a training program for professional care staff. *BMC Palliat Care* 2011;**10**:11.
25. Findley P, Shen C, Sambamoorthi U. Depression treatment patterns among elderly with cancer. *Depress Res Treat* 2012;**2012**, Article ID 676784, 9 pages. DOI: 10.1155/2012/676784
26. Almeida OP, Almeida SA. Short versions of the geriatric depression scale: a study of their validity for the diagnosis of a major depressive episode according to ICD-10 and DSM-IV. *Int J Geriatr Psychiatry* 1999b;**14** (10):858–865.
27. Crawford GB, Robinson JA. The geriatric depression scale in palliative care. *Palliat Support Care* 2008;**6**(03):213–223.
28. Fountoulakis KN, Tsolaki M, Iacovides A, *et al*. The validation of the short form of the geriatric depression scale (GDS) in Greece. *Aging (Milano)* 1999;**11**(6):367–372.
29. Watson M, Greer S, Pruyn J, van den Borne B. Locus of control and adjustment to cancer. *Psychol Rep* 1990;**66**:39–48.
30. Mystakidou K, Tsilika E, Parpa E, *et al*. A test of the psychometric properties of the cancer locus of control scale in Greek patients with advanced cancer. *Psycho-Oncology* 2012;**21** (11):1215–1221. DOI: 10.1002/pon.2014.
31. Oken MM, Creech RH, Tormey DC, *et al*. Toxicity and response criteria of the Eastern Cooperative Oncology Group. *Am J Clin Oncol* 1982;**5**:649–655.

32. Beck AT. *Depression: Clinical, Experimental, and Theoretical Aspects*. Hoeber Medical Division, Harper & Row: New York, 1967.

33. Mehta KM, Yaffe K, Langa KM, Sands L, Whooley MA, Covinsky KE. Additive effects of cognitive function and depressive symptoms on mortality in elderly community-living adults. *J Gerontol Biol Sci Med Sci* 2003;**58A**(5):461–467.

34. Vuger-Kovacic D, Gregurek R, Kovacic D, Vuger T, Kalenic B. Relation between anxiety, depression and locus of control of patients with multiple sclerosis. *Mult Scler* 2007;**13**(8):1065–1067.

35. Moore KA., Seeney F. Biopsychosocial predictors of depressive mood in people with Parkinson's disease. *Behav Med* 2007;**33**(1):29–37.

36. Maltby J, Day L, Macaskill A. *Personality, Individual Differences and Intelligence*. Pearson Prentice Hall: Harlow, 2007.

37. Nurmi JE, Pulliainen H, Salmela-Aro K. Age differences in adults' control beliefs related to life goals and concerns. *Psych Aging* 1992;**7**:194–196.

38. Walston KA, Wallston BS, DeVellis R. Development of the multidimensional health locus of control (MHLC) scales. *Health Educ Monogr* 1978;**6**(2):160–170.

39. Glinder JG, Compas BE. Self-blame attributions in women with newly diagnosed breast cancer: a prospective study of psychological adjustment. *Health Psychol* 1999;**18**(5):475–481.

40. Twenge JM, Zhang L, Im C. It's beyond my control: a cross-temporal meta-analysis of increasing externality in locus of control, 1960–2002. *Pers Soc Psychol Rev* 2004;**8**(3):308–319.

41. Knappe S, Pinquart M. Tracing criteria of successful aging? Health locus of control and well-being in older patients with internal diseases. *Psychol Health Med* 2009;**14**(2):201–212.

42. Derks W, de Leeuw J, Hordijk G, Winnubst J. Differences in coping style and locus of control between older and younger patients with head and neck cancer. *Clin Otolaryngol* 2005;**30**(2):186–192.

43. Aldwin CM, Gilman DF. *Health Illness and Optimal Aging*. Sage: London, 2004.

44. Neipp MC. Control beliefs and coping in women with breast cancer at follow-up stage. Unpublished Phd Thesis. Miguel Hernández University, Elche. Spain, 2005.