ORIGINAL RESEARCH

The Impact of Loneliness and Cancer Diagnosis on Cognitive Impairment in Geriatric Patients

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ABSTRACT Objective: The evaluation of cognitive functioning is important for assessing the health of a geriatric individual. In recent years, there has been a progressive increase in the number of geriatric cancer patients. Loneliness, which is common among geriatrics, is an emotional experience that results from unmet personal or social requirements. The association between loneliness and cognitive dysfunction in elderly patients has been well-documented in the past. However, similar research has not been conducted so far in elderly cancer patients. The purpose of this study was to evaluate the impact of loneliness and cancer diagnosis on cognitive impairment in geriatric patients. **Material and Methods:** Elderly patients of 65 years or older were admitted to the outpatient clinics in the Department of Geriatrics and the Department of Medical Oncology for evaluation. The patients were evaluated using structured questionnaires that consisted of sociodemographic and clinical characteristics. In addition, the patients were tested with the UCLA Loneliness Scale (ULS) and the Standardized Mini-Mental State Examination (SMMSE). **Results:** A total of 334 geriatric patients (214 patients diagnosed with cancer, and 120 healthy/normal patients without cancer) were evaluated. Scores of ULS and SMMSE were higher in normal patients. The results of ULS and SMMSE showed a negative correlation between loneliness and cognitive functioning (r=-0.185, p=<0.001). In the multivariate analysis, neither cancer diagnosis nor loneliness was associated with cognitive impairment. **Conclusion:** Cancer diagnosis and loneliness were not found to be associated with cognitive impairment. The topic needs to be further studied in specific homogenous groups.

Keywords: Loneliness; cognitive dysfunction; cancer; geriatric; geriatrics

Loneliness is described as an unpleasant emotional experience or feeling that results from inadequacies in personal or social requirements. It principally originates from differences between the desired and actual social relations.[1] Its prevalence increases linearly with age, and thus, is found in up to 50% of geriatric patients.[2] Geriatric patients are more exposed to loneliness; hence, this subject has been studied more extensively in the geriatric patient group. Female geriatric patients have been documented to be at higher risk of loneliness due to factors such as being single/widowed, older age, low educational status, low household income, living alone, decreased quality of social interactions, poor health, and decreased functional status.[3] In addition, the presence of depression has been associated with increased loneliness.[4,5] Studies on the clinical effects of loneliness on geriatric patients have shown that loneliness is associated with mental health issues, reduced sleep quality, decreased quality of life, increased hospitalizations, and increased mortality.[6-9] In addition, loneliness has been associated with cognitive dysfunction and Alzheimer's disease.[10-13]

Cancer patients are more prone to cognitive decline due to primary disease, its psychosocial effects and treatment-related toxicities.[14] Following chemotherapy, 15-45% of cancer patients become prone to memory loss, attention deficit, and inability to conduct daily/basic activities, all of which can cause worsened quality of life, challenges in daily functioning/decision-making, lack of treatment adherence and in some cases, shorter survival.[14-17] In a study conducted in breast cancer survivors, loneliness was found to be associated with concentration and memory problems.[18] The negative impact of loneliness on cognitive functioning has been well-documented in geriatric non-cancer patients. However, in geriatric cancer patients, the data gathered is limited. The purpose of this study is to analyze the impact of loneliness and cancer diagnosis on cognitive dysfunction in geriatric patients.

MATERIAL AND METHODS

Elderly patients of 65 years and above were admitted to outpatient clinics in the Department of Geriatrics and the Department of Medical Oncology for evaluation in the study. Patients with a diagnosis of psychiatric disorder; diagnosis, history, or suspicion of the intracranial tumor (either primary or metastatic brain tumor); history of cranial surgery; or history of cerebrovascular disease were excluded. All the patients provided written informed consent for involving in the study. During the evaluation, the clinicians recorded clinical data, primary disease, and disease status of the patients. The patients were evaluated by healthcare professionals, who were trained to prepare inventories and assess the pathology of cognitive dysfunction. The study was performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki, and the study protocol was approved by the Institutional Ethics Committee (IEC). The patients were included in the study only after providing written informed consent.

Structured questionnaires were used to analyze the sociodemographic and clinical characteristics of the patients. The questionnaire consisted of questions on demographic data, comorbidities, and psychiatric history. Demographic data included marital status, presence of siblings, personal address (city center vs. town or village), educational status, employment, and monthly household income. In addition, the patients were tested with the UCLA loneliness Scale (ULS), and the Standardized Mini-Mental State Examination (SMMSE), both of which had been validated in the Turkish language.[19-23] Patients with any degree of cognitive impairment were consulted for further evaluation and follow-up.

STATISTICAL ANALYSIS

Analysis of the participants' characteristics was done by proportions for categorical variables. Student's t-test was used for assessment of differences between continuous variables. The Chi-Square test or Fisher's exact test was used to compare categorical variables. The correlation between ULS and SMMSE was calculated by using Pearson's test. In ULS, the median value was used as a cut-off to group scores into low or high. According to the analysis in the Turkish population by Güngen et al., a score of 24 was accepted as the cut-off value for cognitive dysfunction.[22] The 'monthly household income' parameter was divided into two groups: <2000 tl vs. >2000 tl. Literate or illiterate patients were grouped under 'educational status'. In the 'employment' parameter, actively working patients, and patients who had never worked before were grouped under 'other'. Univariate analysis of the factors associated with increased ULS or cognitive dysfunction was done by Chi-Square or Fisher's exact test. Due to the inequality of baseline characteristics between cancer and non-cancer patients, a multivariate analysis was performed. A logistic regression model was performed for multivariate analysis. Characteristics like low social support, low educational status, >75 years of age, female gender, high income, being retired, diagnosis of cancer, living in a rural area, presence of comorbidity, and high loneliness score were tested in the logistic regression model for cognitive impairment. SPSS 17.0 statistics software was used to perform all statistical analyses.

RESULTS

During the months between July and October of 2016, 334 geriatric patients (214 patients from the Department of Medical Oncology, i.e.,-cancer patients, and 120 from the Department of Geriatrics, i.e., normal patients without cancer) with a mean age

of 70 (+/-5.7) were evaluated. The characteristics of the patients are given in Table 1. The scores of ULS (41.5 vs. 39.5, p=0.038) and SMMSE (26.2 vs. 254.7, p=0.003) were higher in patients without cancer.

A negative correlation was found between loneliness and cognitive functioning (r=-0.185, p=<0.001). This negative correlation was documented both in cancer patients (r=-0.206, p=0.001) and non-cancer patients (r=-0.262, p=0.002). The factors associated with SMMSE scores are summarized in Table 2. Of the total 334 patients, 89 (26.6%) patients, which included 29.4% of cancer patients and 21.7% of non-cancer patients (p=0.07), showed a certain degree of cognitive impairment. Factors such as female gender, living in a rural region, low educational status, low income, being actively working/never worked, and high ULS were associated with cognitive impairment (Table 3).

In the multivariate analysis, both cancer diagnosis and loneliness were not found to be associated with cognitive impairment (Table 4). There was no statistically significant relationship between high loneliness score and cognitive impairment (OR: 1.18 (0.6-2.2), p=0.61). In addition, cancer diagnosis by itself was also not associated with cognitive impairment (OR: 1.79 (0.8-3.6, p=0.11).

TABLE 1: Patient characteristics.				
Patient characteristics	Oncology (n, %) 214 (64.1)	Geriatrics (n, %) 120 (35.9)	p	Total (n, %) 334 (100)
Age, mean (SD)-yr	70.7 (5.1)	73.7 (6.2)	<0.001	70.0 (5.7)
≥75 years old, n/%	48 (22.4)	52 (43.3)	<0.001	100 (29.9)
Female	69 (32.2)	76 (63.3)	<0.001	145 (43.4)
Marital Status				
Married	174 (81.3)	65 (54.2)	<0.001	239 (71.6)
Single/Widow	40 (18.7)	55 (45.8)		95 (28.4)
Siblings present	207 (96.7)	111 (92.5)	0.07	318 (95.2)
Living in city center	172 (80.4)	107 (89.2)	0.025	279 (83.5)
Total monthly income				
Less than 2000 tl	124 (57.9)	77 (64.2)	0.15	201 (60.2)
More than 2000 tl	90 (42.1)	43 (35.8)		133 (39.8)
Educational Status				
Illiterate/Literate	20 (9.3)	42 (35.0)	<0.001	62 (18.6)
Job				
Retired	165 (77.1)	56 (46.7)	<0.001	221 (66.2)
Working	2 (0.9)	3 (2.5)		5 (1.5)
Not working	47 (22.0)	61 (50.8))		108 (32.3)
Comorbidity present	133 (62.1)	99 (82.5)	<0.001	232 (69.5)
Previous psychiatry admission	50 (23.4)	31 (25.8)	0.35	81 (24.3)
Diagnosis				
Head and Neck/Lung Cancer	57 (26.6)			
Gastrointestinal Cancer	91 (42.5)			
Breast Cancer	19 (8.9)			
Urogenital Cancer	27 (12.6)			
Others	20 (9.3)			
Disease status				
Remission-Follow-up	101 (47.2)			
Adjuvant Therapy	55 (25.7)			
Palliative chemo/radiotherapy	50 (23.4)			
Palliative Care	8 (3.7)			

TABLE 2: SMMSE scores of oncology and geriatric patients.						
	Mini-mental Score					
	Oncology		Geriatrics		Total	
Patient characteristics	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p
Age						
>75	25.1 (3.3)	0.48	24.9 (4.2)	0.003	25.0 (3.8)	0.095
<75	25.8 (4.2)		27.2 (3.8)		25.8 (4.2)	
Sex						
Female	24.1 (4.1)	<0.001	25.5 (4.3)	0.018	25.0 (4.2)	0.001
Male	25.3 (4.0)		27.3 (3.5)		26.0 (3.9)	
Marital Status						
Married	24.7 (4.3)	0.54	26.4 (4.6)	0.58	25.3 (4.5)	0.92
Single/Widow	25.6 (2.6)		26.0 (3.5)		25.9 (3.3)	
Siblings						
Present	24.8 (4.1)	0.62	26.3 (3.8)	0.67	25.5 (4.0)	0.95
Absent	25.5 (2.5)		25.2 (7.4)		25.3 (5.7)	
Live in						
City center	25.2 (4.2)	0.002	26.2 (4.2)	0.77	25.7 (4.2)	0.002
Rural	23.8 (3.4)		25.9 (3.2)		24.5 (3.4)	
Educational Status						
Illiterate/Literate	20.9 (4.0)	<0.001	25.1 (4.1)	0.032	24.1 (4.4)	0.001
More	25.3 (3.8)		26.8 (4.0)		25.9 (3.9)	
Job						
Retired	25.5 (3.7)	<0.001	26.8 (4.4)	0.15	25.9 (4.1)	0.58
Other	22.4 (5.0)		25.7 (3.8)		25.0 (5.5)	
Comorbidity						
Present	24.7 (4.4)	0.55	26.6 (3.9)	0.07	25.7 (4.2)	0.32
Absent	25.2 (3.5)		24.4 (4.9)		25.0 (4.0)	
Previous psychiatry admission						
Present	25.0 (5.0)	0.95	25.8 (3.7)	0.53	25.4 (4.4)	0.73
Absent	24.8 (3.7)		26.3 (4.2)		25.5 (4.0)	
Disease status						
Remission-Follow-up	25.1 (4.1)	0.99				
Adjuvant Therapy	24.8 (4.0)					
Palliative chemo/radiotherapy	24.7 (3.9)					
Palliative Care	23.9 (4.0)					

DISCUSSION

In this study, we aimed to analyze the association of loneliness and cancer diagnosis with cognitive dysfunction in geriatric patients. To the best of our knowledge, our findings are the first to evaluate the impact of loneliness and cancer diagnosis on cognitive impairment. We demonstrated a high perception of loneliness in 46.1%, and cognitive impairment in 26.6% of geriatric cancer patients. Although a negative correlation was detected between loneliness and SMMSE scores, in multivariate analysis, there was no impact of loneliness and cancer diagnosis on cognitive functioning.

With recent advances in the field of Oncology, the survival rate of cancer patients has increased. In addition to using new therapeutic modalities, clinicians are now also paying special attention to the quality of patient life, psychosocial consequences of cancer and its treatment. Loneliness is a feeling

TABLE 3: Univariate analysis of factors associated with cognitive impairment.

Patient characteristics	Cognitive Impairment (n,%)	p
Age		
>75	31 (31.0)	0.14
<75	58 (24.8)	
Gender		
Female	48 (33.1)	0.014
Male	41 (21.7)	
Marital Status		
Married	62 (25.9)	0.36
Single/Widow	27 (28.4)	
Siblings		
Present	86 (27.0)	0.34
Absent	31 (18.8)	
Living in		
City center	67 (24.0)	0.013
Rural	22 (40.0)	
Educational Status		
Low	27 (43.5)	0.001
High	62 (22.0)	
Total monthly income		
Less than 2000 tl	62 (30.8)	0.02
More than 2000 tl	27 (20.3)	
Job		
Retired	48 (21.7)	0.004
Other	41 (36.3)	
Comorbidity		
Present	57 (24.6)	0.12
Absent	32 (31.4)	
UCLA score		
High	50 (32.5)	0.01
Low	39 (21.7)	
Cancer diagnosis		
Present	63 (29.4)	0.078
Absent	26 (21.7)	

that most cancer patients experience inevitably. However, not much research has been conducted on loneliness in cancer patients. The median ULS of our study population is similar to that of other studies.[24,25] Consistent with the report by Deckx et al., geriatric cancer patients were comparatively less lonely than non-cancer geriatric patients. Except for the study by Deckx et al., no other study has found an association between loneliness and cognitive impairment. The positive correlation be-

tween loneliness and cognitive impairment was confirmed by our analysis. However, in multivariate analysis, we could not demonstrate it as a risk factor.[25]

During diagnostic and therapeutic procedures, cancer patients undergo immense physical pain and psychosocial distress. Although the use of chemotherapeutics has been reported to be the major factor causing cognitive impairment in cancer patients, there is no sufficient data/evidence to prove it.[15,16,26-28] In our study, there was no difference in the SMMSE scores of different disease statuses. In addition, a cancer diagnosis was not associated with cognitive impairment in the multivariate analysis.

Although the study was conducted as a cross-sectional study, there were some limitations. The participants of the study were selected randomly; therefore, baseline characteristics of the study population were different. This difference was managed by performing multivariate analysis. As the aim of the study was to evaluate the impact of a cancer diagnosis on cognitive impairment, the selection of a specific cancer type would have been a better approach rather than studying different cancer types. And, more details of the patients' previous psychiatric disorders could have provided additional data. Other limitations of the study that were inevitable included the grouping of the disease status of the patients, exclusion of cranial pathologies, and lack of analysis of the chemotherapeutics used.

TABLE 4: Multivariate analysis of factors associated with cognitive impairment

Risk Factors	Cognitive Impairment OR (95%CI)	p
Low Educational status	1.93 (0.8-4.4)	0.12
>75 years old	1.36 (0.6-2.7)	0.36
Female	0.88 (0.3-2.3)	0.81
Low income	1.1 (0.6-2.2)	0.63
Retired	0.54 (0.2-1.4)	0.22
Cancer diagnosis	1.79 (0.8-3.6)	0.11
Living in Rural	1.5 (0.6-3.3)	0.29
Comorbidity	1.38 (0.68-2.8)	0.36
High Loneliness score	1.18 (0.6-2.2)	0.61

CONCLUSION

In geriatric cancer patients, cognitive functioning is negatively impacted by increased loneliness. This negative correlation was confirmed by our study. However, in the multivariate analysis, this association could not be demonstrated. The subject needs to be further studied in specific homogenous groups to generate better data that support the above findings.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

All authors contributed equally while this study preparing.

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