

Depressive symptoms and its influencing Factors among Elderly Cancer Patients Receiving Chemotherapy

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Abstract

Background: Depression is the most common mental health problem affecting older patients with cancer. It's associated with mortality risk, non-compliance with treatment, and chemotherapy intolerance. **Aim of the study:** Assess depressive symptoms and its influencing factors among elderly cancer patients receiving chemotherapy. **Subjects and Methods: Research design:** A descriptive design was utilized. **Setting:** The study was conducted at the oncology department at Zagazig University Hospitals, Egypt. **Subjects:** purposive sample composed of 194 older adults aged ≥ 60 years. **Tools of data collection:** two tools were used to collect the study data: I) a structured interview sheet. II) Geriatric Depression Scale short form. Influencing factors were identified by using chi-square and multiple linear regression analysis. **Results:** among the studied elderly, 37.1% had mild depressive symptoms, 12.9% had moderate, and 18.6% had severe depressive symptoms. Statistically significant relations were found between depressive symptoms and female gender, illiteracy, insufficient monthly income, living alone, comorbidities, lung cancer, cancer stage four at diagnosis, and receiving ≥ 4 chemotherapy cycles. **Conclusion:** high prevalence of depressive symptoms and many influencing factors were identified among older patients with cancer receiving chemotherapy. **Recommendation:** ongoing assessment of depressive symptomatology of older adults along with chemotherapy with consideration of the influencing factors is a must for early intervention and better outcomes.

Keywords

Depressive symptoms, elderly, cancer, chemotherapy, influencing Factors

Introduction

Geriatric population is worldwide challenge (¹). In Egypt, The number of older persons reached 6.3 million in 2017, accounting for 6.7% of the total population (²). Depression is a serious condition affecting geriatric people, about 15% of older adult Americans are affected (³). Aging is associated with multiple factors predisposing to depression; social isolation, loneliness, loss of bereavement, and income (⁴). Cancer is a disease of the elderly (⁵). Cancer is the second most common cause of death worldwide, currently, 60% of all cancers occur in patients aged 65 years and older and the incidence of malignancy in older adults is expected to increase by 67 % by the year 2030 (⁶). Depression is three times more common in patients with cancer than in the general population. There are several reasons that make those patients at a greater risk of

developing depression compared with those without cancer; the cancer diagnosis, cancer treatment and cancer-related physical symptoms such as pain, fatigue, and other physical limitations may lead to depression. Functional impairment, poor social support, cognitive decline, polypharmacy and multimorbidity are the main factors associated with depression in older cancer patients (⁷). Although chemotherapy is associated with several adverse effects in older adults, is still one of the most common cancer treatments used. Depression is widely recognized as one of the most common adverse effects of chemotherapy. Depressive symptoms are the behavioral indicators associated with a depressed mood include; hopelessness, helplessness, guilt, reduced ability to concentrate, suicidal ideation or attempts and

physical symptoms such changes in appetite and sleep, psychomotor disturbance, or nonspecific complaints of body pains, and fatigue⁽⁸⁾. In older adults, somatic symptoms of depression may be more noticeable than in younger age. Levels of depressive symptoms in cancer patients rang from sadness to clinical depression⁽⁹⁾.

Depression in cancer patients has been associated seriously compromised physical activity, poor social contact, and worsening cancer symptoms, so early detection of depression may result in better therapeutic effects⁽¹⁰⁾.

Gerontological nurses can play a vital role in assessment and management of depression in older cancer patients undergoing chemotherapy. It is important that the nurse should anticipate depression in all older patients with cancer. The nurse should utilize new and innovative approaches to provide support and meet the psychosocial health needs to those patients and help them to re-address their hope trajectory in a more realistic way⁽¹¹⁾.

Significance of the study:

Depression is the most common mental health problem affecting older patients with cancer receiving chemotherapy. Depression in older adults is often misdiagnosed and undertreated as the healthcare professionals may misinterpret an older adult's symptoms of depression as just a natural part of illness or the aging changes, and therefore not see the depression as condition to be treated. Untreated depression is associated with poor quality of life, non-compliance with treatment, and chemotherapy intolerance. Therefore, assessment of depressive symptoms of elderly undergoing chemotherapy is very important to enhance treatment outcomes.

Aim of the study:

The current study aimed to assess depressive symptoms and its influencing factors among elderly cancer patients receiving chemotherapy at Zagazig University Hospitals, Egypt.

Research Questions:

1. What is the level of depressive symptoms among elderly cancer patients receiving chemotherapy?
2. What are the influencing factors of depressive symptoms among elderly cancer patients receiving chemotherapy?

Subjects and methods:

Research design:

A descriptive design was used

Study setting:

The current study was carried out at the oncology department at Zagazig University Hospitals, Egypt.

Study subjects:

A purposive sample composed of 194 patients who aged 60 years or above, received at least one chemotherapy cycle with any type of cancer, and able to communicate was selected in the recruitment of this study. Patients with brain metastasis or history of mental illness such as schizophrenia, anxiety or mood disorders are excluded.

Sample size calculation:

The sample size was calculated using EPI Info software program version 6.04. Assuming that the total population of elderly cancer patients receiving chemotherapy at zagazig university hospitals is 900 based on hospital records and the prevalence of depressive symptoms in a previous study was 20%⁽¹²⁾ at confidence level 95%, so the sample was 194.

Tools of data collection:

Two tools were used to collect necessary data. **Tool I: a structured interview questionnaire** which consisted of two parts;

Part (1): used to assess the demographic characteristics which included age, gender, residence, marital status, educational level, and monthly income.

Part (2): involved questions about the history of comorbidities, medications, receiving other cancer treatment, previous history of chemotherapy; some data were obtained from patients' medical records (cancer type, cancer stage at diagnosis, and number of chemotherapy cycles).

Tool II: The Geriatric Depression Scale short form [GDS: SF]⁽¹³⁾.

This scale was developed by Sheikh and Yesavage. An Arabic version of the test was used and validated by Shehata⁽¹⁴⁾ and Abd El-Galeel⁽¹⁵⁾. The GDS: SF involves 15 questions requiring "yes" or "no" answers. Of the 15 items, 10 indicate depression when responded positively while the rest indicate depression when responded negatively (question numbers 1, 5, 7, 11, 13). A score over five suggests depression. Scores higher than ten are almost always depression⁽¹³⁾, a more detailed scoring is often more helpful in rating depression. A score from 0 to 4 suggests free of depressive symptoms, 5 to 8 suggests mild depression, 9 to 11 suggests moderate depression, and 12 to 15 suggests severe depression⁽¹⁶⁾.

Content validity & Reliability:

The tools were revised by three experts in the field of gerontological nursing, psychiatric and mental health nursing, and public health medicine in Zagazig University. The panel reviewed the tools content for relevance, clarity, comprehensiveness, and understandability. The reliability of this tool was tested through measuring its internal consistency. In the current study, Cronbach α of GDS: SF was 0.84.

Fieldwork

Once the approval was granted to progress in the study, the researcher started to organize a schedule for

collecting the data. The researcher visited study setting to be familiar with work process, time of work and observe elderly attending the study settings to a set schedule for data collection.

The researcher used to go to the study setting for interviewing the elderly who fulfill the criteria. The purpose of the study was explained to each elderly individually, and then the elderly was asked to participate in the study. The study tool questions were answered by each patient privately. The time needed to answer the interview questionnaire ranged from 25 to 35 minutes. The fieldwork was executed over the period from May 2019 up to the beginning of September 2019; four days per week (Sunday, Monday, Wednesday and Thursday) from 9.00 AM to 3.00 PM.

Pilot study:

A pilot study was carried out on 20 (10%) elderly patients attending the study setting. The purposes of the pilot study were to test the feasibility, clarity and applicability of the study tools. Since there was no modifications in the data collection tools after conducting the pilot study, hereafter the pilot study was included in the studied sample.

Administrative and ethical considerations:

The study was approved by the Research Ethics Committee (REC) and the Postgraduate Committee of the Faculty of Nursing at Zagazig University. Verbal consent was obtained from the patients after a description of the purpose of the study.

Statistical analysis:

The collected data were organized, tabulated and statistically analyzed using the Statistical Package for Social Sciences (SPSS) version 22. Data was presented using descriptive statistics in the form of frequencies and percentages. Chi-square test (χ^2) was used for comparisons between qualitative variables. Cronbach alpha coefficient

was calculated to assess the reliability of GDS: SF scale through their internal consistency. In order to identify the independent predictors of the scores of GDS: SF, the multiple linear regression analysis was used. Statistical significance was considered at p value < 0.05 .

Results:

Among 194 studied elderly, the mean age was 65.4 ± 4.9 years, 55.2% were males and 53.6% belonged to rural areas. 66.5% of the elderly were married, 49% were illiterate, and 49% had insufficient monthly income, and 64.4% were living with their spouse (**Table 1**). Referring to the prevalence of depressive symptoms among the studied patients, **Figure 1** illustrates that 37.1% had mild depressive symptoms, 12.9% had moderate, and 18.6% had severe depressive symptoms. Meanwhile 31.4% of them were free of depressive symptoms.

The current study also indicates that there were highly statistically significant relations between the level of elderly's depressive symptoms and demographic characteristics of the studied elderly as gender, marital status, educational level, monthly income and living condition at $P < 0.01$. In addition, there were statistically significant relations between the level of elderly's depressive symptoms and residence ($p=0.03$). It is evident that the elderly with severe depressive symptoms were females, belonged to urban areas, married, illiterate, had insufficient income, and living alone (**Table 3**).

As regard to clinical characteristics of the studied elderly, 59.3% of the elderly had comorbidities. The highly reported diseases were hypertension (40%), diabetes (32.2%), and heart diseases (23.5%). 70.6% of the elderly were on regular medications, of which, 70.8% were taking three or more medications per day. The most common cancer diagnosis were lung cancer (25.8%), breast cancer (22.7%), and liver cancer (14.4%).

37.1% of the elderly patients were diagnosed at stage III, while 28.9% had stage IV, 30.9% had II stage, and only 3.1% had stage I. Regarding chemotherapy, 78.9% of the elderly received four or more chemotherapy cycles, 10.3% received chemotherapy previously, and 46.4% received other cancer treatments (**Table 2**).

The study findings also revealed that elderly's level of depressive symptoms was highly statistically significant related to comorbidities ($p=.001$), cancer stage at diagnosis ($p=.000$) and number of chemotherapy cycles ($p=.000$). While, there were statistically significant relations between elderly's level of depressive symptoms and cancer type ($p=.02$), previous chemotherapy ($p=.025$) and receiving other cancer treatments ($p=.01$). It is evident that the elderly with severe depressive symptoms had comorbidities, lung cancer, cancer stage four, received four or more cycles of chemotherapy, and received other cancer treatments (**Table 4**).

Table 5 revealed that educational level, living condition, comorbidities, time since cancer diagnosis, cancer stage at diagnosis, and number of chemotherapy cycles were statistically significant independent predictors of the elderly's depressive symptoms.

Discussion:

The current study findings revealed high prevalence of depressive symptoms among the studied patients as slightly more than two-thirds of them had depressive symptoms. They are classified into three levels; more than one-third of them had mild depressive symptoms, beside more than one-tenth had moderate depressive symptoms and nearly one-fifth had severe depressive symptoms. Such results might be due to a variety of reasons including; cancer itself increases the vulnerability to depression as Smith⁽¹⁷⁾ reported that pro-inflammatory cytokines were linked with depressive symptoms in cancer patients.

Chemotherapy side effects can also increase the risk of developing

depression by increasing functional impairments that make the elderly patients more dependent. Also, the complexity of the process for obtaining treatment decrease patients' satisfaction as it takes too much time and effort. As well, the long chemotherapy treatment period; as more than two-thirds of the studied patients undergoing chemotherapy from months and the rest one-third undergoing it from more than one year this could increase the risk of depression .

Similarly, Lee et al ⁽¹⁸⁾ who conducted a study in Korea found that almost two-thirds of the elderly patients receiving chemotherapy had depressive symptoms, where one-third of them had mild depressive symptoms and more than one-fifth had moderate and severe depressive symptoms. In the same stream, a study conducted in France by Hoppe et al. ⁽¹⁹⁾ reported that nearly half of the patients had depressive symptoms.

On the contrary, low prevalence rates of depressive symptoms were found in a study in Belgium conducted by Kenis et al. ⁽²⁰⁾ who demonstrated that the prevalence of depressive symptoms among the surveyed patients was 20.6%. Another prospective study that carried out by Atag et al. ⁽¹²⁾ in Izmir, Turkey found that the prevalence of depressive symptoms in elderly cancer patients on active chemotherapy was 19.4%.

This disparity in the result might be due to diverse reasons including; high health awareness that enable the patients understand the nature of the disease. Beside there are various means of recreation for the elderly in such countries compared to Egypt where very few social activities and clubs are found. Moreover efficient quality health care that facilitates good management of chemotherapy side effects which in turn increases the tolerance of chemotherapy and improving patient satisfaction. As well, easy accessibility to treatment as health insurance in the developed countries involve every person in the

community thus no financial burden on the patient .

As to relation between depression and gender among the studied elderly, the results of the current study indicated that moderate and severe depressive symptoms were more prevalent in females than males. This difference was mainly attributed to the fact that depression is two times as likely to occur in females than males according to WHO ⁽²¹⁾, this is consistent with Moieni et al. ⁽²²⁾ who explicated that the changes in pro-inflammatory cytokines which causing depression was significant for females but not for males. Also, it might return to the fact that females do report and express their symptoms more readily than males. Similarly, Bektas & Demir ⁽²³⁾ conducted a study in Turkey to examine the anxiety-depression levels of patients with gastrointestinal cancer and found that female patients had higher depression scores.

Concerning the relation between educational level and depressive symptoms, the current study exposed that the illiterate patients experience the highest percentages of all depression levels. Further, educational level was statistically significant independent predictor for depressive symptoms. This result might be attributed to the fact that well-educated individuals are more adaptive to the disease process and more receptive to health education messages, more understandable of their condition, its management, and to find many ways of coping strategies.

On the other hand, illiteracy is often associated with low socioeconomic status which negatively affects the quality of life and may increase risk of depression. Likewise, a study in Nepal conducted by Sharma & Zhang ⁽²⁴⁾ reported that depression was negatively correlated with educational status, moreover educational status was found to be a predictor of depression levels among breast cancer patients.

Concerning the relation between monthly income and depressive

symptoms, the current study exposed that the elderly patients with insufficient income had severe depressive symptoms. Such results might be due to that cancer and chemotherapy increase the financial burden on geriatric patients as many of them are defraying some of their treatment expenses besides low economic status that already present. As well, lower socioeconomic status is also associated with less social activity and less interpersonal communication this can lead to depression. Similarly, Jianci ⁽²⁵⁾ carried out a study in China and reported that studied patients with low income suffered from severe depressive symptoms than those with high income.

Pertaining to the relation between living condition and depressive symptoms, the current study indicated that severe depressive symptoms were statistically significant higher among elderly who were living alone. Further, living condition was statistically significant independent predictor for depressive symptoms. Such results might be attributed to that cancer and receiving chemotherapy are considered a strong stressful situation that require high level of social support while older adults living alone tend to receive less social support which put the patients at helplessness and negative feelings and finally leads to depression. In accordance with this a study conducted in France by Duc et al. ⁽²⁶⁾ informed that living alone was significantly associated with a higher risk of depressive symptoms.

Considering relation between comorbidity and depression, the current study clarified that there was a highly association between presence of comorbidity and all levels of depressive symptoms. Moreover, comorbidity was statistically significant independent predictor for depressive symptoms. Such results may be due to the occurrence of cancer and treatment with chemotherapy in patients who already have another disease definitely worse their quality of

life and increase their suffering. As well, Suppli et al. ⁽²⁷⁾ who conducted a study in Denmark to identify risk of depression after breast cancer reported that the risk is highest in comorbid conditions. Similarly, a study in Germany by Meier et al. ⁽²⁸⁾ found a strong association between high levels of depression and higher scores on the comorbidity index among older patients with hematological cancer.

The current study also demonstrated that the patients with lung cancer had severe depressive symptoms than other types. It might be attributed to that more than half of the studied patients were smoker or previous smokers as the smoking increase the risk of lung cancer, so they probably blaming themselves for their illness ⁽²⁹⁾. In addition to dyspnea is a common symptom among lung cancer patients which interferes with all aspects of patients' life. In the same context, a study conducted in china which carried out by Hong & Tian ⁽³⁰⁾ found that depression level was high among patients with lung cancer compared to other types .

As to relation between cancer stage at diagnosis and depressive symptoms, the current study exposed that elderly patients with advanced cancer stage had more severe depressive symptoms. Further, cancer stage at diagnosis was statistically significant independent predictor for depressive symptoms. The proper explanation is that advanced stage of disease is often associated with more severe symptoms, more adverse effects of treatment, increased physical impairment and decreased the expectations and hopes to cure that may increase the depression levels. Similarly, Alacacioglu et al. ⁽³¹⁾ carried out a study in Turkey and reported that there was a positive correlation between disease stage and depression levels.

Considering the relation between number of chemotherapy cycles and depressive symptoms, the current study revealed that the patients who

received four or more chemotherapy cycles had severe depressive symptoms. Further, number of chemotherapy cycles was statistically significant independent predictor for depressive symptoms. Such results might be due to the recurrences of chemotherapy side effects in every cycle, the long duration of treatment with chemotherapy, and repeated visits to the hospital having a deteriorating effect on the psychological wellbeing of these patients and may make the patients lose their hope to cure. Similarly, Albusoul et al. ⁽³²⁾ conducted study in Nebraska to assess the change in breast cancer women at four times: baseline, during third and fourth cycles of chemotherapy and one month after finishing chemotherapy and concluded that depression was most severe during chemotherapy and least severe during baseline.

Based on the current study findings, time since cancer diagnosis was statistically significant independent predictor for depressive symptoms. Possible explanation of such result is that the long term suffering from being diagnosed with cancer as more than half of the studied patients were diagnosed with cancer from more than one year and still receiving treatment for their condition may generate feelings of hopelessness, loss of control and uncertainty around survival and death. On the same line, a study in Germany which carried out by Hartung et al. ⁽³³⁾ reported that time since current cancer diagnosis showed a small but significant positive correlation with higher levels of depressive symptoms.

Conclusion:

High prevalence of depressive symptoms and many influencing factors were identified among older patients with cancer receiving chemotherapy. Severe depressive symptoms were more common among elderly who were females, belonged to urban areas, married, illiterate, had insufficient income, and living alone.

Also, elderly cancer patients who had comorbidities, lung cancer, cancer stage four, received four or more cycles of chemotherapy, and received other cancer treatments experienced severe depressive symptoms compared to other patients. Moreover, educational level, living condition, comorbidities, time since cancer diagnosis, cancer stage at diagnosis, and number of chemotherapy cycles were statistically significant independent predictors of depressive symptoms among elderly cancer patients receiving chemotherapy. On other hand, age show no relation with depressive symptoms.

Recommendations:

In view of the study findings, the following recommendations are proposed:

- Ongoing assessment of depressive symptomatology of older adults along with chemotherapy with consideration of the influencing factors is a must for early intervention and better outcomes.
- Training program should be directed to nurses to improve their knowledge and skills about depression screening and how to conduct the psychoeducational program.
- Nurses, psychiatrists, physicians, and social workers should collaborate through a multidisciplinary team for early detection and treatment of depression.
- Psychoeducational program should be tailored for patients and their families to help them understand psychological problems, needs, and learn new ways of coping strategies.
- The nurse should inform patients and their families about the social support services available in their communities.
- In every oncology department, a mental health unit should be available to provide psychosocial support services for patients and their families.

- Further studies are needed to measure the effect of psych educational program in improving depressive symptoms among older adult patients receiving chemotherapy.

Table (1): Demographic characteristics of elderly in the study sample (N=194)

Item	Frequency	Percentage
Age (year)		
60-<70	128	(66)
70-<80	54	(27.8)
≥80	12	(6.2)
Mean ± SD	65.4±4.9	
Gender		
Male	107	(55.2)
Female	87	(44.8)
Residence		
Rural	104	(53.6)
Urban	90	(46.4)
Marital status		
Single	4	(2.1)
Married	129	(66.5)
Divorced	5	(2.6)
Widowed	56	(28.8)
Educational level		
Illiterate	95	(49)
Read & write	12	(6.2)
Primary	8	(4.1)
Preparatory	9	(4.6)
Secondary	11	(5.7)
University	59	(30.4)
Monthly income		
Sufficient	93	(47.9)
Not sufficient	95	(49)
Sufficient & save	6	(3.1)
Living condition		
Alone	31	(16)
Husband / wife	125	(64.4)
Sons	34	(17.5)
Relatives	4	(2.1)
Crowding index		
≤2	155	(79.8)
≥3	39	(20.1)
Caregiver		
Him / herself	17	(8.8)
Family members	177	(91.2)

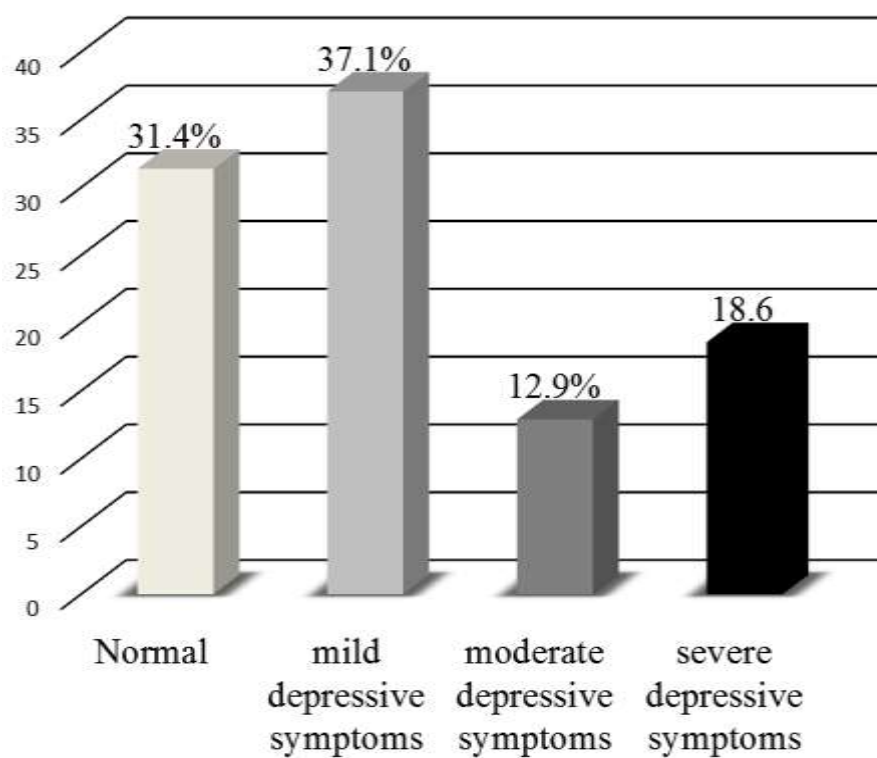


Figure (1): Levels of depressive symptoms among the studied elderly according to geriatric depression scale short form [GDS: SF] (N=194)

Table (2): clinical characteristics of the studied elderly (N=194)

Item	Frequency	Percentages
Comorbidities		
Yes	115	(59.3)
No	79	(40.7)
On regular medication		
Yes	137	(70.6)
No	57	(29.6)
Cancer type		
Skin	8	(4.1)
Lung	50	(25.8)
Breast	44	(22.7)
Liver	28	(14.4)
Colon	18	(9.3)
Prostate	11	(5.7)
Non Hodgkin lymphoma	15	(7.7)
Other	20	(10.3)
Cancer stage at diagnosis		
Stage I	6	(3.1)
Stage II	60	(30.9)
Stage III	72	(37.1)
Stage IV	56	(28.9)
No. of chemotherapy cycles		
One	8	(4.1)
Two	25	(12.9)
Three	8	(4.1)
Four or more	153	(78.9)
Previous chemotherapy		
Yes	20	(10.3)
No	174	(89.7)
Received other cancer treatments		
Yes	90	(46.4)
No	104	(53.6)

Table (3): Relations between demographic characteristics of the studied elderly and their Level of depressive symptoms (N=194)

Items	Level of depressive symptoms								P-Value
	Normal (n=61)		Mild (n=72)		Moderate (n=25)		Severe (n=36)		
	N	%	N	%	N	%	N	%	
Age (year)									
60-<70	36	(59)	42	(58.3)	18	(72)	32	(88.8)	0.301
70-<80	21	(34.4)	26	(36.1)	5	(20)	2	(5.6)	
≥80	4	(6.6)	4	(5.6)	2	(8)	2	(5.6)	
Gender									
Male	48	(78.7)	45	(62.5)	7	(28)	7	(19.4)	.000**
Female	13	(21.3)	27	(37.5)	18	(72)	29	(80.6)	
Residence									
Rural	33	(54.1)	35	(48.6)	20	(80)	16	(44.4)	0.03*
Urban	28	(45.9)	37	(51.4)	5	(20)	20	(55.6)	
Marital status									
Single	1	(1.6)	0	(0.0)	1	(4)	2	(5.6)	.001**
Married	50	(82)	51	(70.8)	8	(32)	20	(55.6)	
Divorced	0	(0.0)	3	(4.2)	2	(8)	0	(0.0)	
Widowed	10	(16.4)	18	(25)	14	(56)	14	(38.8)	
Educational level									
Illiterate	18	(29.5)	37	(51.4)	18	(72)	22	(61.1)	.000**
Read & write	2	(3.3)	3	(4.2)	2	(8)	5	(13.9)	
Primary	2	(3.3)	6	(8.3)	0	(0.0)	0	(0.0)	
Preparatory	3	(4.9)	3	(4.2)	3	(12)	0	(0.0)	
Secondary	2	(3.3)	3	(4.2)	0	(0.0)	6	(16.7)	
University	34	(55.7)	20	(27.7)	2	(8)	3	(8.3)	
Monthly income									
Sufficient	36	(59)	38	(52.8)	8	(32)	11	(30.6)	.000**
Not sufficient	19	(31.1)	34	(47.2)	17	(68)	25	(69.4)	
Sufficient & save	6	(9.8)	0	(0.0)	0	(0.0)	0	(0.0)	
Living condition									
Alone	0	(0.0)	0	(0.0)	0	(0.0)	31	(86.1)	.000**
Husband / wife	55	(90.1)	60	(83.3)	10	(40)	0	(0.0)	
Sons	2	(3.3)	12	(16.7)	15	(60)	5	(13.9)	
Relatives	4	(6.6)	0	(0.0)	0	(0.0)	0	(0.0)	

*significant at $p < 0.05$.**highly significant at $p < 0.01$.

Table (4): Relations between clinical characteristics of the studied elderly and their Level of depressive symptoms (N=194)

Items	Level of depressive symptoms								P-Value
	Normal (n=61)		Mild (n=72)		Moderate (n=25)		Severe (n=36)		
	N	%	N	%	N	%	N	%	
Comorbidities									
Yes	18	(29.5)	47	(65.3)	20	(80)	30	(83.3)	.001**
No	43	(70.5)	25	(34.7)	5	(20)	6	(16.7)	
On regular medication									
Yes	40	(65.6)	47	(65.3)	20	(80)	30	(83.3)	0.220
No	21	(34.4)	25	(34.7)	5	(20)	6	(16.7)	
Cancer type									
Skin	0	(0.0)	2	(2.8)	2	(8)	4	(11.1)	0.02*
Lung	7	(11.5)	17	(23.6)	6	(24)	20	(55.6)	
Breast	24	(39.3)	15	(20.8)	2	(8)	3	(8.3)	
Liver	7	(11.5)	15	(20.8)	2	(8)	4	(11.1)	
Colon	5	(8.2)	9	(12.5)	4	(16)	0	(0.0)	
Prostate	3	(4.9)	3	(4.2)	2	(8)	3	(8.3)	
Non Hodgkin lymphoma	5	(8.2)	5	(6.9)	3	(12)	2	(5.6)	
Other	10	(16.4)	6	(8.3)	4	(16)	0	(0.0)	
Cancer stage at diagnosis									
Stage I	5	(8.2)	1	(1.4)	0	(0.0)	0	(0.0)	.000**
Stage II	26	(42.6)	19	(26.4)	8	(32)	7	(19.4)	
Stage III	18	(29.5)	34	(47.2)	8	(32)	12	(33.3)	
Stage IV	12	(19.7)	18	(25)	9	(36)	17	(47.2)	
No. of chemotherapy cycles									
One	8	(13.1)	0	(0.0)	0	(0.0)	0	(0.0)	.000**
Two	20	(32.8)	3	(4.2)	2	(8)	0	(0.0)	
Three	2	(3.3)	5	(6.9)	1	(4)	0	(0.0)	
Four or more	31	(50.8)	64	(88.9)	22	(88)	36	(100)	
Previous chemotherapy									
Yes	2	(3.3)	2	(2.8)	0	(0.0)	16	(44.4)	.025*
No	59	(96.7)	70	(97.2)	25	(100)	20	(55.6)	
Received other cancer treatments									
Yes	25	(41)	30	(41.7)	10	(40)	25	(69.4)	0.01*
No	36	(59)	42	(58.3)	15	(60)	11	(30.6)	

*significant at $p < 0.05$. **highly significant at $p < 0.01$.

Table (5): Best fitting multiple linear regression model for GDS: SF

	Unstandardized Coefficients		standardized Coefficients	t-test	P. value
	B	Standard error	Beta		
Gender	.558	.147	.729	2.337	.059
Educational level	.520	.126	.440	8017	.028*
Monthly income	.378	.210	.567	1.307	.067
Living condition	.631	.056	.116	9.561	.021*
Comorbidities	.357	.219	.821	14.276	.003**
Time since cancer diagnosis	.661	.320	.602	12.785	.004**
Cancer stage at diagnosis	.638	.290	.418	14.004	.002**
Chemotherapy cycles	.562	.118	.395	11.356	.007**
Model summary					
Model	R	R square	Adjusted R square	Std. error of estimate	
Regression	.926	.846	.857	.263	

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