



Research Article

Online ISSN (3219-2789)

Frailty and Fatigue in the Elderly Cancer Patients at Wasit Specialized Oncology Center, Wasit, Iraq

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Received: 22 June 2026; Revised: 28 August 2026; Accepted: 3 September 2026

Abstract

Background: Cancer is a general term for a big group of diseases that affect many systems of the human body. Incessant fatigue was recorded as the most frequent continuing symptom, explained by patients taking cancer drugs. Frailty also causes competing risks of mortality and morbidity independent of cancer and its therapy. **Objective:** To evaluate the frailty and fatigue status of elderly patients and find out the association between frailty and fatigue among elderly patients with cancer in an oncology center. **Methods:** A cross-sectional study was accomplished and involved 191 patients who had cancer and received maintenance at Wasit Specialized Oncology Center in Al-Kut, Wasit, Iraq. Data collection was conducted using a non-probability convenience sampling method from February to May 2026. The "Tilburg Frailty Indicator" to determine the frailty status and "Cancer Fatigue Scale" to measure the level of fatigue were used. **Results:** 78% of the elderly with cancer were frail, with a mean score of 5.88 ± 2.312 and high frailty; 70.2% of the elderly demonstrated moderate fatigue, with a mean score of 40.21 ± 7.198 . There was a statistically significant positive correlation between patients' Tilburg Frailty Indicator and Cancer Fatigue Scale scores ($r=0.285$, $p<0.001$), and the strongest positive statistically significant predictors of frailty were educational level and age. **Conclusions:** Frailty is highly prevalent among elderly patients with cancer and is strongly associated with fatigue. These findings support the need for routine frailty assessment and targeted clinical interventions to improve cancer patient outcomes.

Keywords: Cancer patients; Elderly; Frailty; Fatigue; Iraq; Oncology centre.

الوهن والإرهاق بين كبار السن مرضى السرطان في مركز واسط المتخصص للأورام، واسط، العراق

الخلاصة

الخلفية: السرطان مصطلح عام لمجموعة كبيرة من الأمراض التي تؤثر على العديد من أنظمة جسم الإنسان. تم تسجيل التعب المستمر كأكثر الأعراض المستمرة شيوعاً، ويُفسر ذلك المرضى الذين يتناولون أدوية السرطان. كما يسبب الوهن مخاطر متنافسة للوفاة والمراضة بغض النظر عن السرطان وعلاجه. **الهدف:** تقييم حالة الوهن والإرهاق لدى كبار السن واكتشاف العلاقة بين الوهن والإرهاق بين كبار السن المصابين بالسرطان في مركز الأورام. **الطرائق:** أجريت دراسة مقطعية شملت 191 مريضاً مصابين بالسرطان وتلقوا العلاج في مركز واسط التخصصي للأورام في الكوت، العراق. تم جمع البيانات باستخدام طريقة أخذ عينات ملائمة غير احتمالية من شباط إلى أيار 2026. تم استخدام "مؤشر هشاشة تيلبورغ" لتحديد حالة الوهن و"مقياس إرهاق السرطان" لقياس مستوى الإرهاق. **النتائج:** 78% من كبار السن المصابين بالسرطان كانوا واهنين، بمتوسط درجة 5.88 ± 2.312 ووهن عالي؛ أظهر 70.2% من كبار السن إرهاقاً متوسطاً، بمتوسط درجة 40.21 ± 7.198 . كان هناك ارتباط إيجابي ذو دلالة إحصائية بين مؤشر وهن تيلبورغ ومقياس إرهاق السرطان لدى المرضى ($r=0.285$, $p<0.001$)، وكانت أقوى المؤشرات الإيجابية ذات الدلالة الإحصائية للوهن هي المستوى التعليمي والعمر. **الاستنتاجات:** الوهن شائع جداً بين كبار السن المصابين بالسرطان وترتبط ارتباطاً وثيقاً بالإرهاق. تدعم هذه النتائج الحاجة إلى تقييم روتيني للوهن والتدخلات السريرية المستهدفة لتحسين نتائج مرضى السرطان.

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Article citation: Okab AA, Jawad AK, Ubaid HA, Al-Attar WM, Abbas IH, Abbas AH, Goni MD. Frailty and Fatigue in the Elderly Cancer Patients at Wasit Specialized Oncology Center, Wasit, Iraq. *Al-Rafidain J Med Sci.* 2026;11(2):112-120. doi: <https://doi.org/10.54133/ajms.v11i2.3215>

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INTRODUCTION

Cancer is a general term for a big group of diseases that affect many systems of the human body. Other terms used are malignant tumors and neoplasms [1]. In 2022, cancer was the leading cause of death worldwide, killing almost 10 million people. The most common cancers in 2022 were lung cancer 2.5 million, breast cancer 2.3 million, colon and rectum cancer 1.9 million, prostate cancer 1.5 million, skin cancer 1.2 million, and stomach cancer 1.0 million [2]. Incessant fatigue is recorded as the most frequent, continuing symptom experienced by patients taking cancer drugs [3]. Cancer-related fatigue is distressing

and continual, and there is a personal sense of physical, psychological, and cognitive fatigue related to cancer or cancer treatment that interferes with normal performance [4]. Fatigue associated with cancer or its treatment is different from the typical fatigue that most individuals experience due to daily activities [5]. Unlike normal fatigue in healthy individuals, cancer-related fatigue is disproportionate to physical activity level and is not relieved by rest or sleep [6]. Data from the Iraqi Cancer Control Board and the Iraqi Ministry of Health indicate a significant increase in cancer rates in Iraq recently, with thousands of new cases registered annually across various governorates. National statistics indicate that

breast cancer is the most prevalent type of cancer, accounting for approximately 19.7% of all registered cases, followed by lung and bronchial cancer at 7.86% and colorectal cancer at 6.97%. Other common types include brain and central nervous system tumors (6.21%), leukemia (5.34%), bladder cancer (4.58%), thyroid cancer (4.45%), non-Hodgkin lymphoma (4.06%), prostate cancer (3.40%), and stomach cancer (3.25%). These indicators reflect the growing health burden that cancer represents in Iraq, especially in light of the increasing incidence rates associated with aging and various environmental and health factors, which calls for strengthening early detection programs, intensifying health awareness efforts, and developing diagnostic, therapeutic, and preventive services to reduce the impact of the disease and its complications [7]. Since this information is factual, a significant number of cancer patients experience cancer therapy-related fatigue, which includes both physical and psychological aspects, and this fatigue is one of the most reported symptoms among cancer patients [8]. Fatigue is also one of the well-known symptoms of radiotherapy or antineoplastic therapy in cancer patients, with about 65-100% and 82-96% of patients receiving radiotherapy or chemotherapy developing severe fatigue [9]. In the United States, cancer incidence is higher among people over 70 years. Approximately 30% of US patients diagnosed with cancer are 65 to 74 years old, and another 25% are 75 years or more. Comparable incidence rates across age groups have been reported for other areas and nations [10]. Globally, the average life expectancy of the elderly is steadily increasing, and the global proportion of elderly people (over 60 years) is predicted to rise from 9% to 16% by 2025 [11]. Vulnerable elderly subjects are more susceptible to unfavorable health problems and complications during therapy. "Frailty is an established term to describe aging-associated vulnerability" [12,13]. It recognized a main barrier of cancer treatment in elderly patients [14]. With frailty, longer-lasting treatment success is difficult to achieve. Frailty increases the risk of chemotherapy intolerance and of poorer treatment response [15]. Frailty may also cause competing risks of mortality and morbidity independent of cancer and its therapy. The prevalence of frailty in elderly cancer patients is around 40–50%, with a wide range from 5% to 90% depending on patient population and the method used to assess frailty [16]. International and national medical societies, specifically the "International Society of Geriatric Oncology (SIOG) and the American Society of Clinical Oncology (ASCO)," developed guidance for assessing frailty in the elderly prior to the initiation of cancer treatment [17]. There is increased knowledge that frailty in older patients with cancer is not a static biomarker that just needs to be recorded at a single point to make final treatment decisions [18]. In these individuals, frailty is subject to dynamic changes throughout the remainder of the patient's life. This raises the question of whether frailty should be recorded frequently during cancer treatment and for specific purposes. Compared to the amount of guidance available for the initial assessment of frailty

in older adults with cancer, advice regarding frailty monitoring is remarkably limited to date [19]. Recent evidence has established that fatigue is common and clinically significant among elderly with cancer, with its prevalence varying according to its definition, assessment tools, and demographic and clinical characteristics [16,20,21]. Cancer-related fatigue is also a common symptom that impacts daily functioning and quality of life [3,8,9]. However, evidence remains limited in low- and middle-income countries, where gaps exist in the screening, assessment, and provision of appropriate care for fatigue [22-24]. This gap is particularly significant in Iraq, given the increasing burden of cancer and the aging population [7]. Despite the importance of fatigue in the elderly with cancer, studies investigating their relationship, especially within the Iraqi context, remain limited. Therefore, there is a clear need for local evidence to inform this relationship and guide screening and supportive care strategies tailored to the Iraqi health context. The aims of the study were to evaluate the frailty status and fatigue status of elderly patients and to find out the association between frailty and fatigue among elderly patients with cancer in the oncology center.

METHODS

Study design, setting, and participants

A cross-sectional study was accomplished and involved 191 patients who had cancer and received maintenance at Wasit Specialized Oncology Center in Al-Kut, Wasit, Iraq. Data were gathered through in-person interviews conducted at this center over a period of 4 months from February to May 2026. This study recruited patients who met the inclusion criteria and visited the sites throughout the study period. The patient population included individuals aged 64 years and older who were diagnosed with cancer, receiving therapy for more than three months, capable of communicating in and comprehending Arabic, and who agreed to complete the fill questionnaire. The research study excluded patients who declined to participate and patients with mental and psychological disorders. While many international bodies use age 65 to define older adults, the World Health Organization and the United Nations use age 60 as a benchmark, particularly in low- and middle-income countries, where age-related health changes may begin earlier [25]. Recent epidemiological analyses indicate that individuals aged 60 and older represent a significant proportion of new cancer cases in low- and middle-income countries [26]. Accordingly, the current study adopted age 64 and older as the minimum age for defining older adults, in accordance with the local demographic and clinical context in Iraq.

Sample size calculation

The sample size was calculated by the sample size formula for describing cross-sectional studies, on the basis of findings from a similar previous study [27]. considering an alpha of 0.05, 90% power, 95% CI, and

a 10% sample attrition rate. The final sample size was calculated to be at least 191 eligible participants. In this study, participants were selected using the non-probability convenience sampling method to recruit 191 elderly individuals who met the predefined study inclusion criteria during the data collection period. The eligible participants were selected purposively from the center. This approach was considered appropriate to ensure that the elderly cancer patients had intended selection criteria in the center.

Data collection and study instrument

During the visit to the center, researchers explained the aims and methods of the study to the center's managers, who acted as mediators to deliver study instructions to all patients attending the center. Each patient, a principal researcher, and another member of the healthcare team with experience in the therapy care unit were interviewed for 20-30 minutes. Each patient was interviewed for 20-30 minutes by a principal researcher and another member of the healthcare team who had experience in the therapy care unit. The questionnaires were translated from English to Arabic using forward translation by a bilingual translator. The Arabic version was then back translated into English by an independent translator who had not seen the original. After comparing the back-translated version with the original, linguistic and conceptual equivalence was confirmed, and necessary adjustments were made to address any discrepancies. The wording was also reviewed to ensure the questionnaire's suitability for the Iraqi context and culture, as well as its ease of understanding by participants, without altering the core concepts or the content of the questionnaire items. A structured questionnaire was used with the following: patients' sociodemographic characteristics such as age, gender, marital status, occupation, economic status, level of education, and event last year). The second part was to assess the level of frailty utilizing the Tilburg Frailty Indicator (TFI) [27] Arabic version [28]. The TFI scale comprised two parts by evaluating (A) determinants of frailty and (B) components of frailty, including (B1) physical components, (B2) psychological components, and (B3) social components. The Cancer Fatigue Scale (CFS) [29] was the third part. The questionnaire consisted of 15 items: 8 of physical items, 4 of affective items, and 3 of cognitive items. A pilot study was conducted with (10) patients to verify the reliability of the research scales; these patients were excluded from the final study sample. The validity of the research instruments, the Arabic version of the questionnaire, was presented to 8 experts to assess the clarity of items, their suitability to the study's objectives, their scientific accuracy, and their relevance to the concept being measured. The expert comprised specialists with relevant clinical and academic backgrounds in community medicine, adult nursing, and community health nursing with experience in instrument validation. Reliability was assessed using Cronbach's alpha coefficient, and the

results showed an acceptable level of internal consistency for the TFI scale (0.83) and the CFS (0.85), confirming the instrument's suitability for use in the study.

Ethical considerations

The research protocol was approved by the Wasit Health Directorate, Wasit Specialized Oncology Center, and the Medical Ethics Committee of the Middle Technical University, which provided the official certificate (Ref no. MEC: 190, 2026). Each participant provided a signed consent form before enrolling in the study.

Statistical Analysis

The study data were analyzed using SPSS version 28.0 (IBM SPSS Statistics, Chicago, Illinois, USA) to ensure accurate interpretation of the results. Statistical methods employed included calculating frequency distributions, percentages, means, and standard deviations to describe the sample characteristics and levels of frailty and fatigue among the elderly, based on the Tilburg Frailty Indicator (TFI) and Cancer Fatigue Scale (CFS). Pearson's correlation test was used to determine the strength and direction of the relationship between frailty and fatigue. To examine differences in frailty and fatigue scores according to sociodemographic and clinical variables, the Independent Samples t-test and one-way ANOVA were applied, depending on the nature of the variables studied. Additionally, two-way and multivariate analyses were conducted to identify more comprehensive factors associated with frailty and fatigue. Multiple linear regression analysis was used to identify variables independently predicting fatigue levels, while binary logistic regression analysis was used to identify factors associated with patients' debilitating condition. The variables included in the analysis were age, gender, place of residence, comorbidities, life events in recent years, and relevant socioeconomic factors. The operationalization of the concept of statistical significance involved defining a $p < 0.05$ as the threshold for statistical significance, with results of $p < 0.001$ considered highly significant, given the multiple statistical comparisons performed in the study, thereby ensuring more conservative and robust interpretation of the findings.

RESULTS

Table 1 shows that less than half of patients (41.9%) were within the age range of 64 to 68 years (1.77 ± 0.746), more than half (58.6%) were female, 80.1% lived in urban areas, most of them (82.1%) were married, most (69.6%) were unemployed, 61.3% were within moderate economic status, and less than half (28.3%) were illiterate. Health status of participants: 59.2% are not healthy, 69.1% had a serious illness event last year, and 56% answered yes to suffering from other diseases.

Table 1: General characteristics of elderly participants in the study (n= 191)

	Category	n(%)		Category	n(%)
Age (year)	64-68	80(41.9)	Gender	Male	79(41.4)
	69-73	75(39.3)		Female	112(68.6)
	74 and more	36(18.8)	Marital status	Single	12(6.2)
	M±SD	1.77±0.746		Married	157(82.1)
Residence	Urban	153(80.1)		Divorce	2(1.0)
	Rural	38(19.9)		Widow	20(10.4)
Occupation	Working	19(9.9)	Economic status	Good	21(11)
	Don't working	133(69.6)		Moderate	117(61.3)
	Retirement	39(20.5)		Weak	51(26.7)
Educational level	not read and write	49(25.7)	Health status	Healthy	4(2.1)
	Literate	54(28.3)		Not healthy, not unhealthy	113(59.2)
	Primary School	29(15.2)		Unhealthy	4(38.7)
	Preparatory School	25(13.1)	suffer from other disease	Yes	107(56)
	Bachelor	34(17.8)		No	84(44)
Event last years	Death of a family member	47(24.6)			
	Your own serious illness	132(69.1)			
	A family member's serious illness	9(4.7)			
	The end of an important intimate relationship	3(1.6)			

Figure 1 shows that most participants (51.3%) have breast cancer, while 15.2% of them have lung cancer.

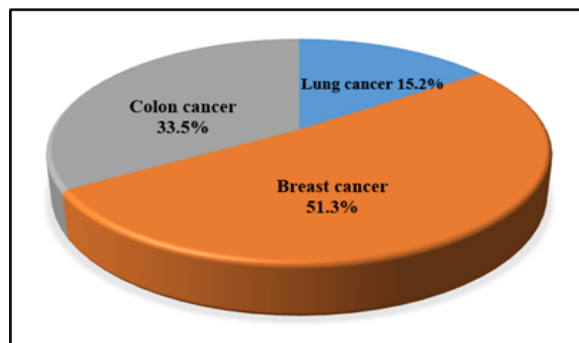
**Figure 1:** Distribution of cancer categories of elderly.

Table 2 shows the mean score domains of the Tilburg Frailty Indicator: physical domain (3.23 ± 1.515), psychological domain (1.43 ± 1.002), and social domain (1.22 ± 0.652). Approximately 78% of elderly participants were frail (5.88 ± 2.312). Table 3 shows the mean scores of the cancer fatigue scale: physical subscale (20.58 ± 4.594), affective subscale (9.32 ± 2.927), and cognitive subscale (10.31 ± 3.108). Approximately 70.2% of elderly participants were in moderate fatigue status (40.21 ± 7.198). Table 4 demonstrates a strong positive correlation between patients' Tilburg Frailty Indicator and Cancer Fatigue Scale ($r = -0.285, p < 0.001$), indicating that increased frailty was associated with fatigue, whereas better frailty status was associated with fatigue status.

Table 2: Frailty status of elderly participants in the study according to Tilburg Frailty Indicator (n= 191)

Domain	mean±SD	Non-frail n(%)	Frail n(%)	Total mean±SD
Physical domain	3.23±1.515			
Psychological domain	1.43±1.002	42(22)	149(78)	5.88±2.312
Social domain	1.22±0.652			

Table 3: Distribution of Fatigue status to elderly participants according to Cancer Fatigue Scale (n= 191)

Cancer Fatigue Scale	mean±SD	Fatigue status	n(%)	Total mean±SD
Physical	20.58±4.594	Mild	49(25.6)	
Affective	9.32±2.927	Moderate	134(70.2)	40.21±7.198
Cognitive	10.31±3.108	Severe	8(4.2)	

Table 5 demonstrates that educational level was the strongest positive statistically significant predictor of frailty ($OR = 3.556, p < 0.001$), while residence ($OR = 4.028, p = 0.019$), gender ($OR = 2.977, p = 0.038$), and occupation ($OR = 1.299, p = 0.021$) were associated with frailty. Additionally, no statistically significant changes were reported for age, marital status, economic status, health status, event last year, and suffering from other diseases ($p > 0.05$). Table 6

reveals that patients with health status were positively associated with fatigue ($\beta = 0.190, p = 0.013$). Conversely, those patients with age were significantly associated with lower fatigue levels ($\beta = -0.168, p = 0.045$), and gender presents a significant association with lower fatigue levels ($\beta = -0.179, p = 0.034$). Crucially, there was an inverse association between educational level and fatigue ($\beta = -0.181, p = 0.034$). On the other hand, no significant associations were

observed for patients' residence, marital status, occupation, socioeconomic status, event last year, and suffering from other diseases ($p > 0.05$). Table 7 shows highly statistically significant differences across

marital status, educational level, event last year, and suffering from other diseases with frailty ($p = 0.010$, <0.001 , 0.004 , and 0.013 , respectively).

Table 4: Correlation Between Tilburg Frailty Indicator and Cancer Fatigue Scale (n=191)

Variables	Tilburg Frailty Indicator	Cancer Fatigue Scale
Tilburg Frailty Indicator	1.0	
R		0.285
p		<0.001
Cancer Fatigue Scale		1.0
R	0.285	
p	<0.001	

Table 5: Logistic regression analysis for to Tilburg Frailty Indicator (n=191)

Variable	B	OR	95% CI	p-value
Age	0.555	1.741	0.352-2.483	0.115
Gender	1.091	2.977	0.526-4.299	0.038
Residence	1.393	4.028	0.592-5.533	0.019
Marital status	0.033	1.033	0.011-0.308	0.915
Occupation	1.299	3.665	0.563-5.324	0.021
Economic status	0.112	1.119	0.097-0.36	0.755
Educational level	1.269	3.556	0.277-20.923	<0.001
Health status	0.497	1.645	0.457-1.187	0.276
Event last years	0.736	2.088	0.451-2.67	0.102
suffer from other disease	-0.110	0.896	0.097-0.351	0.755

Table 6: Multiple linear regression analysis for Cancer Fatigue Scale (n=191)

Variable	Unstandardized Coefficients B±SE	Standardized Coefficients B	p-value
Age	-0.114±0.056	-0.168	0.045
Gender	-0.183±0.086	-0.179	0.034
Residence	0.131±0.097	0.104	0.179
Marital status	-0.044±0.057	-0.06	0.441
Occupation	-0.065±0.071	-0.07	0.358
Economic status	-0.034±0.063	-0.045	0.584
Educational level	-0.064±0.030	-0.181	0.034
Health status	0.183±0.073	0.19	0.013
Event last years	0.102±0.074	0.10	0.174
suffer from other disease	-0.108±0.064	-0.123	0.095

This table shows statistically significant differences across residences ($p = 0.026$). No significant differences were noted across patients' age, gender, occupation, economic status, and health status. In terms of fatigue, there were highly significant differences across age, residence, educational level, and health status ($p < 0.001$, < 0.001 , 0.019 , and 0.010 , respectively). This table shows statistically significant differences across occupation ($p = 0.024$). While no significant differences were noted across patients' gender, marital status, even last years, and suffering from other diseases.

DISCUSSION

To our knowledge, this is the first study in Iraq to assess the frailty status and fatigue status of elderly cancer patients receiving therapy due to their disease. The current study shows that most participants were aged between 64 and 68 years old, and more than half were female. These results are in close agreement with a study performed by others who found that participants were 72 years old. Most of the participants were 62% female [30]. Additionally, the study found that most older adults reside in rural areas, were married, and over half were unemployed

according to their age and health status. The majority of the elderly are classified as having moderate economic status, and a high percentage of them are illiterate. More than half of elderly people's health status is mediocre; more than half of elderly people had serious illness events in the last years and suffer from other diseases. These findings are a mirror of the recent study results [11] that revealed that 72% of the elderly resided in urban areas, 89.4% were married, and over half (55.8%) of the individuals were unemployed. The present study found more than three-quarters of the elderly with cancer were experiencing a high prevalence of clinically significant frailty. Frailty is particularly common in elderly people with cancer; various studies show a considerable percentage of this population was affected. In a separate study [31], the prevalence of frailty varied from 4% to 81%, constituting a clinically significant condition among elderly cancer patients, and it is independently linked to inferior outcomes across various tumor types [32]. This study demonstrated a high prevalence of frailty among cancer patients undergoing chemotherapy, and its findings provided important preliminary evidence regarding the risk factors associated with the development of fatigue during treatment.

Table 7: Comparison of Tilburg Frailty Indicator and Cancer Fatigue Scale according to socio-demographic characteristics (n= 191)

Variable	Category	TFI M±SD	p-value	CFS M±SD	p-value
Age	64-68	0.79±0.412	0.847	1.91±0.427	<0.001
	69-73	0.76±0.430		1.63±0.540	
	74 and more	0.81±0.401		1.83±0.507	
Gender	Male	0.78±0.414	0.793	1.81±0.508	0.625
	Female	0.78±0.418		1.77±0.502	
Residence	Urban	0.76±0.426	0.026	1.75±0.544	<0.001
	Rural	0.84±0.370		1.95±0.226	
	Single	1.00±0.000		1.83±0.389	
Marital status	Married	0.76±0.426	0.01	1.79±0.519	0.79
	Divorce	0.00±0.000		2.00±0.000	
	Widow	0.85±0.366		1.70±0.470	
Occupation	Working	0.68±0.478	0.107	1.84±0.375	0.024
	Don't working	0.76±0.429		1.83±0.510	
	Retirement	0.90±0.307		1.95±0.498	
Economic status	Good	0.76±0.436	0.496	1.57±0.507	0.117
	Moderate	0.81±0.397		1.81±0.474	
	Weak	0.73±0.451		1.82±0.555	
Educational level	not read and write	0.57±0.500	<0.001	1.82±0.565	0.019
	Literate	0.80±0.407		1.91±0.486	
	Primary School	0.76±0.435		1.86±0.351	
	Preparatory School	0.88±0.332		1.56±0.507	
Health status	Bachelor	1.00±0.000	0.561	1.65±0.485	0.01
	Healthy	1.00±0.000		1.50±0.577	
	Not healthy, not unhealthy	0.78±0.417		1.71±0.529	
Event last years	Unhealthy	0.77±0.424	0.004	1.92±0.430	0.186
	Death of a family member	0.77±0.428		1.81±0.398	
	Your own serious illness	0.79±0.410		1.80±0.535	
	A family member's serious illness	1.00±0.000		1.44±0.527	
Suffering from other disease	The end of an important intimate relationship	0.00±0.000	0.013	2.00±0.000	0.21
	Yes	0.75±0.436		1.73±0.487	
	No	0.82±0.385		1.86±0.518	

These results were obtained through a systematic assessment of the clinical and health factors influencing the development of fatigue in cancer patients during different phases of chemotherapy. The current findings indicate a significantly higher prevalence of frailty among the sample compared to rates recorded among older adults in the community, reflecting the substantial health and functional burden this group faces. This higher prevalence may be explained by the inclusion of patients with complex and multiple health conditions, such as chronic diseases, functional decline, and long-term treatments with their associated physical and psychological effects on overall health. The results also demonstrate that frailty is not simply a consequence of aging but is also linked to the accumulation of health problems and a diminished ability to cope with the demands of illness and treatment. These findings emphasize the necessity of early frailty detection and the integration of periodic frailty and functional assessments into routine oncology care for this group, as detailed further in the Clinical Implications section. Another study shows that most participants have breast cancer because the oldest participants in the study are women. Other researchers reported that elderly breast cancer survivors with perceived cognitive impairment and poorer cognitive performance reported poorer physical functioning, increased frailty, and poorer QoL [33]. The current study indicates that elderly people with cancer experience moderate fatigue, specifically in physical, affective, and cognitive dimensions. The affective dimension scored lowest, suggesting that it performed worst in terms of psychological adaptation. Furthermore, the study identified a statistically significant positive correlation between patients' frailty and fatigue. According to these findings, cancer affects multiple aspects of frailty and fatigue, particularly those related to physical and psychological factors. The studies [34-

36] indicated an association between frailty and fatigue in elderly patients, particularly those with cancer. Higher levels of frailty status are associated with changes in fatigue status. These studies also indicate that the decline in physical and functional status in patients negatively impacts their ability to perform daily activities, leading to reduced functional performance and a lower quality of life. Fatigue is one of the most common and impactful symptoms in older adults with cancer, and it tends to be more pronounced among patients with greater frailty; given the cross-sectional design, this study cannot determine whether frailty precedes or follows fatigue, and the association should not be interpreted as a causal, progressive worsening. This association may be relevant to patients' independence and their need for ongoing healthcare and support. This study provides a more profound understanding of the factors influencing frailty and fatigue in older cancer patients, highlighting the interplay of clinical, psychological, and social factors in the development of these health problems. Multivariate analyses showed that gender, place of residence, occupation, and educational level are independent predictors of frailty risk, while age, gender, educational level, and health status are significantly associated with fatigue levels. A key finding of the study is the consistent and significant effect of both gender and educational level, which were positively associated with an increased likelihood of frailty and inversely associated with fatigue levels. This reflects the important role of social and demographic factors in influencing patients' health and functional status, consistent with growing evidence on gender and educational level in the course of chronic disease among older adults with cancer. Other investigators similarly reported that educational level was significantly associated with fatigue severity [37], that frailty increased with age and was affected by social and educational factors alongside health

status [38], and that among elderly patients with esophageal cancer, educational level was a significant factor in cognitive frailty, together with depression, malnutrition, and social support [39]. Taken together, these studies suggest that patients with lower educational attainment may be more prone to frailty and fatigue, plausibly reflecting limited health literacy and reduced access to healthcare and social support, while women may report higher levels of frailty and psychological symptoms related to cancer and its treatment, potentially reflecting a combination of biological, psychological, and social factors. This study demonstrated a positive correlation between frailty and fatigue, on the one hand, and the duration of cancer and its associated treatment, on the other. This aligns with the concept of the cumulative physiological burden resulting from the persistence of the disease and its long-term effects. Furthermore, studies indicated that longer treatment durations, along with the associated psychological and physical burdens, were linked to greater declines in functional status and higher levels of frailty and fatigue in elderly patients with cancer. However, due to the cross-sectional design of the study, these results cannot be considered conclusive evidence of a causal relationship between treatment duration and these outcomes. These findings support previous research indicating that disease duration is a significant factor associated with worsening frailty, deteriorating clinical outcomes, and persistent feelings of chronic fatigue and exhaustion in patients. It has been previously reported that patients experiencing debilitating symptoms during advanced or prolonged stages of cancer were more likely to suffer from poor clinical outcomes, including reduced treatment tolerance, increased complications, and higher rates of hospitalization and mortality [40]. It also indicated that prolonged illness and treatment were associated with increased physical and functional fatigue and a decline in the patient's overall health. Other researchers reported that prolonged illness and palliative chemotherapy were associated with increased frailty and rapid functional decline in older adults with cancer [41]. Higher frailty scores were also associated with reduced overall survival, increased persistent fatigue, and impaired functional capacity. Additionally, other researchers showed that long-term cancer survivors experience higher levels of weakness, fatigue, and reduced mobility compared to those without cancer [42]. The results also indicated that the continuation of the long-term effects of the disease and treatment contributes to a decline in quality of life, increased functional limitations, and chronic stress.

Strength and Limitation

This study is one of the first to assess the link between frailty and fatigue in elderly cancer patients with cancer in Iraq. Furthermore, this study is the first to assess the effects of frailty in patients receiving therapy, offering novel evidence-based information on the interrelated and aggravating nature of these illnesses that affect their lives. The most important

strength of this study is that it provides a clear and significant understanding of the problems related to frailty and fatigue experienced by elderly patients with cancer who are undergoing treatment, as well as strategies to reduce the occurrence and progression of weakness, thereby contributing to a less severe end-of-life experience for these patients and improving medical services to mitigate the effects of frailty and fatigue on their health. However, several limitations arise in the study that warrant consideration when interpreting its results. The cross-sectional design does not directly establish a causal relationship between frailty and fatigue but rather only clarifies the nature of the correlation between the variables at a specific point. Furthermore, the use of non-probability convenience sampling may affect the representativeness of the sample of the target population, potentially limiting the generalizability of the results and increasing the likelihood of bias in participant selection. The study also relied on self-reported data from patients, which may make the results susceptible to recall bias or the influence of the desire to provide socially acceptable answers. Additionally, the study was conducted at a specialized oncology center within a single governorate, which may reduce the geographical and demographic diversity of the sample. Therefore, caution should be exercised when generalizing the results to other communities or healthcare institutions with different demographic or service characteristics. One of the most prominent challenges that researchers faced during the data collection phase was the refusal of some patients to participate in the survey as a result of their deteriorating health condition or their suffering from fatigue and exhaustion related to the disease and treatment, which affected the ease of completing the data collection procedures within the period specified for the study. A further limitation of this study is the failure to collect certain important clinical variables, such as cancer stage, type of treatment, number of chemotherapy cycles, radiation, immunotherapy, and targeted therapy, duration of disease since diagnosis, and disease spread. These factors could not be included as predictors or covariates in the regression models. Given the potential influence of these characteristics on both asthenia and fatigue, some of the observed associations between sociodemographic variables and asthenia or fatigue may be affected by unmeasured clinical factors. Future studies should therefore include these variables to conduct more comprehensive multivariable analyses that account for disease burden and treatment intensity.

Clinical Implication

The findings of this study have profound implications for clinical practices and healthcare systems related to the care of elderly patients with cancer. The clear correlation between frailty and fatigue indicators emphasizes the necessity of adopting individualized treatment plans that consider each patient's health and functional characteristics. This ensures a balance between the effectiveness of therapeutic interventions and the patient's ability to tolerate side effects and the

challenges associated with the disease and treatment. The study also emphasizes the necessity to enhance the preparedness and competence of healthcare providers to address the complex needs of this age group by developing their knowledge and skills in geriatrics and comprehensive health and functional assessments. Furthermore, continuing education and professional development in geriatric care are essential for improving the quality of healthcare services provided to elderly cancer patients. The results indicate that addressing these aspects can effectively contribute to improving treatment outcomes, reducing health complications, limiting functional decline, and enhancing the quality of life and independence of elderly cancer patients. Based on these findings, the study recommends incorporating routine frailty screening using validated instruments such as the Tilburg Frailty Index (TFI) into the initial assessments of cancer patients aged 60 and older and referring patients exhibiting signs of frailty to a comprehensive geriatric assessment before treatment decisions are made. It also recommends providing multidisciplinary care involving oncologists, geriatricians, nurses, dietitians, and physiotherapists, along with structured exercise programs and nutritional support to minimize functional decline and the risk of frailty. Furthermore, tailored strategies for managing cancer-related fatigue should be implemented, including education on energy conservation and progressive activity programs that address the physical, emotional, and cognitive aspects of fatigue.

Conclusion

The research focuses on the early detection of frailty and fatigue and the need to integrate their assessment into routine care in both oncology and geriatrics. This early identification of patients at higher risk of health complications and functional decline will contribute to improved therapeutic and preventive interventions and enhance the quality of healthcare provided to this population. The study also emphasizes the need for comprehensive, multidisciplinary interventions that address physical, psychological, and social aspects to improve the quality of life and treatment outcomes for this at-risk population. Moreover, the findings emphasize the necessity of adopting patient-centered healthcare strategies that holistically consider the health and social needs of patients.

Future Prospects

The study recommends future longitudinal research to assess the effectiveness of targeted therapeutic interventions and to clarify the causal relationships between frailty, fatigue, and their associated variables more accurately.

ACKNOWLEDGMENTS

The authors thank the elderly patients who participated in study.

Conflict of interests

The authors declared no conflict of interest.

Funding source

The authors did not receive any source of funds.

Data sharing statement

The data that supports the findings of this study are available from the corresponding author upon a reasonable request.

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