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Fatigue and Its Associated Factors among Colorectal Cancer Patients in Erbil City, Iraq

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ABSTRACT: Backgrounds and Objectives: Cancer-related fatigue (CRF) is one of the most common and distressing symptoms reported by patients with colorectal cancer (CRC), yet it remains poorly characterized and instrument-based epidemiological data are scarce. This study aimed to determine the prevalence of fatigue and its associated factors among colorectal cancer patients in Erbil City, Iraq.

Methods: A descriptive cross-sectional study on a non-probability purposive sample of 140 CRC patients currently receiving or having received cancer treatment at the oncology department in Nanakali Hospital in Erbil City. Data was collected from February to the end of May 2025 using a questionnaire developed for the purpose of data collection. Data were analyzed using descriptive statistics and the chi-square test of association, with statistical significance set at $p < 0.05$.

Results: Nearly all colorectal cancer patients in this sample experienced cancer-related fatigue, with the majority (85.7%) reporting severe fatigue and a substantial burden across the physical, cognitive, and affective domains (mean total CFS score 37.31 ± 2.66). Psychological distress was similarly pervasive, with 97.9% and 98.6% of patients scoring in the abnormal range for anxiety and depression, respectively. Fatigue severity was significantly associated with advanced cancer stage ($p = 0.012$), shorter actual sleep duration ($p < 0.001$), and reduced enthusiasm for daily activities ($p = 0.005$), but showed no significant relationship with sociodemographic characteristics, sleep timing, or other clinical variables. Cancer-related fatigue is closely intertwined with psychological distress, poor sleep quality, functional decline, and pain.

Conclusions: In this study, fatigue severity was significantly associated with cancer stage, shorter actual sleep duration, and difficulty maintaining sufficient enthusiasm for daily activities. However, no significant associations were observed between fatigue severity and most sociodemographic or clinical characteristics examined.

INTRODUCTION

Colorectal cancer (CRC) is the third most commonly diagnosed cancer and the second leading cause of cancer-related mortality worldwide, with approximately 1.93 million new cases and 904,000 deaths estimated globally in 2022 (Bray et al., 2024). Although the incidence of CRC has traditionally been higher in high-income countries, the burden is increasingly important in transitioning countries, where changes in dietary patterns, obesity, physical inactivity, and other lifestyle-related factors may contribute to changing disease patterns (Rawla et al., 2019; Arnold et al., 2017). In Iraq, colorectal cancer represents an important

health concern, although locally generated epidemiological and clinical data remain comparatively limited (Falih Soliman and Jasim Mohamad, 2022).

Among the numerous symptoms experienced by patients with CRC, cancer-related fatigue (CRF) is one of the most common, distressing, and functionally limiting symptoms (Stone et al., 2000; Cella et al., 2001). Although reported prevalence varies according to cancer type, treatment status, assessment method, and the threshold used to define fatigue, CRF is widely recognized as a substantial symptom burden among patients with cancer. The National Comprehensive Cancer Network (NCCN) defines CRF as a distressing, persistent, subjective sense of physical, emotional, and/or cognitive tiredness or exhaustion related to cancer or cancer treatment that is disproportionate to recent activity and interferes with usual functioning (Berger et al., 2015). Unlike ordinary tiredness, CRF is less likely to be relieved by rest or sleep and may persist beyond completion of active treatment (Stone and Minton, 2008). A systematic review and meta-analysis estimated a pooled prevalence of approximately 52%, with substantial variation across populations and clinical circumstances (Ma et al., 2020). Similarly, a multicenter study reported moderate-to-severe fatigue in approximately 45% of patients with cancer and cancer survivors (Wang et al., 2014).

The etiology of CRF is multifactorial, reflecting interactions among disease-related, treatment-related, psychological, and behavioural factors (Bower, 2014; Bower, 2019). Advanced disease, active cancer treatment, poorer performance status, and greater symptom burden have been associated with higher levels of fatigue (Ma et al., 2020; Wang et al., 2014). Psychological distress, particularly anxiety and depression, is also closely associated with CRF (Brown and Kroenke, 2009; Servaes et al., 2002). Proposed mechanisms include inflammatory activity, neuroendocrine dysregulation, altered central nervous system signalling, and behavioural changes (Bower, 2014; Bower, 2019). Sleep disturbance, reduced physical activity, pain, and functional limitations may further contribute to the overall burden of fatigue (Palesh et al., 2014; Stone and Minton, 2008).

Accurate assessment of CRF is important because fatigue is multidimensional and may involve physical, affective, and cognitive manifestations. Several instruments have been developed to assess CRF, with the Cancer Fatigue Scale (CFS) specifically designed to evaluate these three dimensions (Minton and Stone, 2009). The CFS consists of 15 items divided into physical, affective, and cognitive subscales (Okuyama et al., 2000). The use of validated instruments allows fatigue to be assessed systematically and facilitates its distinction from ordinary tiredness (National Cancer Institute, 2024).

Despite the substantial burden of CRF among patients with cancer, evidence describing fatigue and its associated factors among patients with colorectal cancer in the Kurdistan Region of Iraq remains limited. Local evidence is particularly important because fatigue may be influenced by disease characteristics, treatment patterns, psychological distress, sleep, pain, and functional status, which may vary across populations and healthcare settings. Therefore, this study aimed to determine the prevalence of fatigue and identify factors associated with fatigue severity among patients with colorectal cancer in Erbil City, Iraq.

Objectives of the study to:

1. Identify sociodemographic and clinical characteristics of colorectal cancer patients.
2. Determine the severity of fatigue among colorectal cancer patients.
3. Describe the level of anxiety and depression among colorectal cancer patients.
4. To assess the association between sleep characteristics and fatigue severity among colorectal cancer patients.
5. Find out the association between the socio-demographic data of patients and their fatigue level.
6. Find out the association between clinical characteristics of patients and their fatigue level.

METHODS

A quantitative, descriptive cross-sectional design was used with a non-probability purposive sample of 140 patients with colorectal cancer diagnosed between 2024 and 2025. Eligibility criteria included adult patients aged ≥18 years, of either gender, who had been diagnosed with colorectal cancer and were currently receiving or having received cancer treatment. Data were collected from February to the end of May 2025 at the Oncology Department of Nanakali Hospital in Erbil City, Iraq.

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Data were collected using a structured five-part questionnaire comprising sociodemographic and clinical characteristics, performance status, pain, fatigue, anxiety and depression, and sleep quality. Performance status was assessed using the Eastern Cooperative Oncology Group (ECOG) Performance Status scale (Oken et al., 1982), while pain intensity was assessed using the Numeric Rating Scale (NRS), ranging from 0 to 10 (Hawker et al., 2011).

Fatigue was assessed using the Cancer Fatigue Scale (CFS), a 15-item instrument comprising physical (7 items), affective/emotional (4 items), and cognitive (4 items) dimensions (Okuyama et al., 2000). Each item was originally scored on a five-point Likert scale. For statistical analysis, responses were subsequently recoded into three ordered categories. Higher scores indicated greater fatigue.

Anxiety and depression were assessed using the Hospital Anxiety and Depression Scale (HADS), which consists of 14 items, with seven items assessing anxiety and seven assessing depression. Each item is scored from 0 to 3, producing subscale scores ranging from 0 to 21. Scores of 0–7 were classified as normal, 8–10 as borderline, and 11–21 as indicating a probable clinical case (Zigmond and Snaith, 1983).

Sleep quality during the previous month was assessed using the Pittsburgh Sleep Quality Index (PSQI) (Buysse et al., 1989).

Content validity of the questionnaire was established through review by a panel of experts. Internal consistency was assessed using Cronbach's alpha based on pilot-study data, yielding a coefficient of 0.85, indicating good internal consistency. The questionnaire was administered through face-to-face interviews by the researcher. Each interview lasted approximately 20–30 minutes.

Data were analysed using the Statistical Package for the Social Sciences (SPSS), version 27. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarise sociodemographic and clinical characteristics and symptom severity. Chi-square tests were used to examine associations between sociodemographic and clinical variables and fatigue severity, categorised as moderate or severe. A p-value of <0.05 was considered statistically significant.

Results:

As indicated in Table 1, the mean age for the colorectal cancer group that participated in the study was 53.91 ± 13.14 years, and more than half of the sample (51.4%) was between 40 and 59 years of age. The female to male ratio was evident in the sample, with a male predominance of 69.3% (n = 97) and the sample was almost entirely married with 97.1% (n = 136). Overall, the educational level was low to moderate ranging from more than 92% of patients being illiterate (31.4%) or primary (30.7%) or secondary (30.0%) school education. With respect to occupation, the largest number of self-employed (48.6%) and housewives (27.1%) were seen. Patients were mostly from urban areas (90.7%). In terms of tobacco smoking, a significant percentage of these were former smokers (37.9%), while most had never smoked a cigarette (60.7%).

Table 1: Socio-demographic Characteristics of Study Participants (n=140)

Variable	Category	Frequency (n)	Percentage (%)
Age Group	≤ 39	19	13.6
	40–49	35	25
	50–59	37	26.4
	60–69	26	18.6
	≥ 70	23	16.4
	Mean ± SD	53.91 ± 13.14	
Gender	Male	97	69.3
	Female	43	30.7
Marital Status	Never Married	2	1.4
	Married	136	97.1

	Widowed	2	1.4
Education Level	Illiterate (Cannot read/write)	44	31.4
	Primary	43	30.7
	Secondary	42	30
	Diploma	9	6.4
	College / University	2	1.4
Occupation	Employed	6	4.3
	Self-employed	68	48.6
	Unemployed	26	18.6
	Retired	2	1.4
	Housewife	38	27.1
Residential Area	Urban	127	90.7
	Sub-urban	7	5
	Rural	6	4.3
Cigarette Smoking Status	Never smoked	85	60.7
	Current smoker	2	1.4
	Former smoker (Ex-smoker)	53	37.9

Note. Values are presented as frequency (n) and percentage (%) for categorical variables, and mean ± standard deviation (SD) for continuous variables. N = total sample size; SD = standard deviation.

Table 2 regarding clinical characteristics, the majority of patients were diagnosed with colon cancer (67.9%) and presented with advanced disease, as Stage IV (58.6%) and Stage III (35.0%) accounted for nearly all cases. Most participants had been diagnosed within the previous six months (41.4%) and had received an average of 11.83 ± 7.17 chemotherapy cycles. The mean BMI was 26.56 ± 4.62 kg/m², placing the sample in the overweight range, and nearly half (44.3%) reported comorbidities. Notably, patients experienced a high burden of pain and functional impairment: 95.0% reported moderate (48.6%) to severe (46.4%) pain, with an overall mean pain score of 6.14 ± 1.73, while most patients were physically restricted from strenuous activity (45.0%) or unable to work (28.6%).

Table 2: Clinical Characteristics of Colorectal Cancer Patients (n=140)

Variable	**Category**	**Frequency (n)**	**Percentage (%)**
Type of Colorectal Cancer	Colon cancer	95	67.9
	Rectal cancer	45	32.1
Stage of Cancer	Stage I	1	0.7
	Stage II	8	5.7
	Stage III	49	35
	Stage IV	82	58.6
Time Since Diagnosis	< 6 months	58	41.4

	6–12 months	47	33.6
	> 1 year	35	25
Current Treatment Modality	Chemotherapy alone	37	26.4
	Chemotherapy + Surgery	100	71.4
	Chemotherapy + Radiotherapy	3	2.1
Current Treatment Phase	During active chemotherapy	102	72.9
	Between chemotherapy cycles	38	27.1
Chemotherapy Cycles Received	Mean ± SD (Range)	11.83 ± 7.17	
BMI	Underweight (< 18.5)	2	1.4
	Normal weight (18.5–24.9)	54	38.6
	Overweight (25.0–29.9)	61	43.6
	Obesity (≥ 30.0)	23	16.4
	Mean ± SD (Range)	26.56 ± 4.62	
Comorbidities	Present (Yes)	62	44.3
	Absent (No)	78	55.7
ECOG Performance Status	Fully active	2	1.4
	Restricted in strenuous activity	63	45
	Ambulatory but unable to work	40	28.6
	Limited self-care	30	21.4
	Completely bedridden	5	3.6
Pain Severity	Mild pain (1–3)	7	5
	Moderate pain (4–6)	68	48.6
	Severe pain (7–10)	65	46.4
	Mean ± SD (Range)	6.14 ± 1.73 (3–10)	

Note: Values are expressed as frequency (n) and percentage (%) unless otherwise specified. N = total sample size; SD = standard deviation; BMI = body mass index (kg/m²); ECOG = Eastern Cooperative Oncology Group performance status

Table 3 The Cancer Fatigue Scale (CFS) was used to assess the severity of fatigue among the patients across three domains: physical, cognitive, and affective fatigue. Table 3 presents the possible and observed score ranges, mean scores, standard deviations, and median scores for each fatigue domain and for the overall CFS.

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Table 3: Overall, Cancer Fatigue Scale (CFS) Score and Domain Subscale Scores (n=140)

Domain / Subscale	Number of Items	Possible Range	Observed Range	Mean ± SD	Median
Physical Fatigue Subscale	7	7 – 21	13 – 21	18.17 ± 1.54	18
Cognitive Fatigue Subscale	4	4 – 12	5 – 12	8.47 ± 1.58	8
Affective Fatigue Subscale	4	4 – 12	7 – 12	10.66 ± 1.12	11
Total Cancer Fatigue Scale (CFS)	15	15 – 45	30 – 43	37.31 ± 2.66	38

As illustrated in Figure 1, severe fatigue was reported by the majority of colorectal cancer patients, with 85.7% (n = 120) classified as having severe fatigue (CFS score 35–45). The remaining 14.3% (n = 20) had moderate fatigue (CFS score 25–34), while none of the participants were classified as having mild fatigue. Overall, severe fatigue was the predominant fatigue category in this sample.

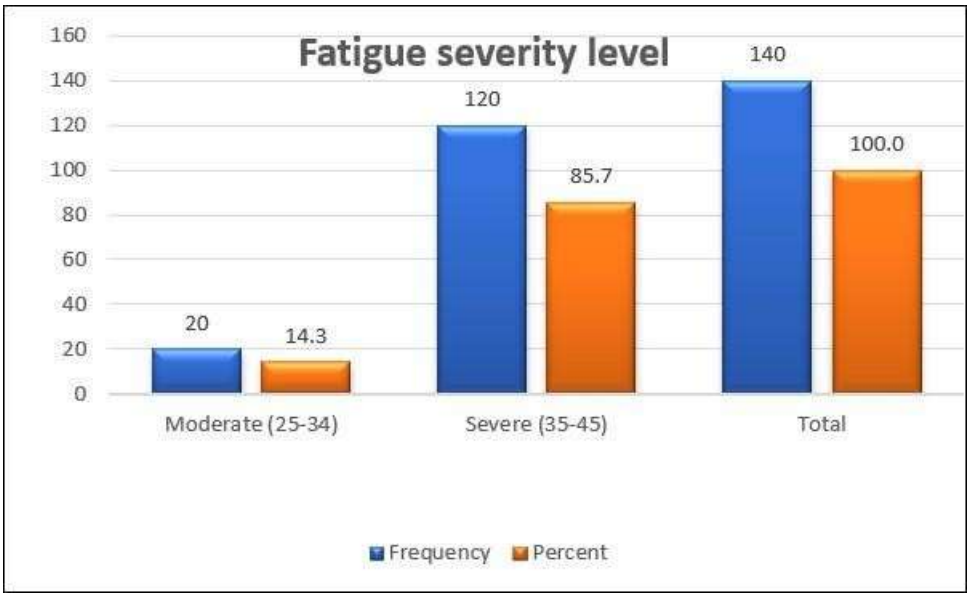


Figure 1: Overall fatigue severity level

Table 4 Anxiety and depression scores were high among the colorectal cancer patients. The mean HADS scores were 14.26 (SD = 1.92) for anxiety and 13.86 (SD = 1.77) for depression, both within the abnormal/case range. Most participants were classified as abnormal/cases for anxiety (137, 97.9%) and depression (138, 98.6%), while 3 (2.1%) participants had borderline abnormal anxiety scores and 2 (1.4%) had borderline abnormal depression scores. No participants scored within the normal range on either subscale. Anxiety scores ranged from 10–21, while depression scores ranged from 10–19.

Table 4: Table: Level of Anxiety and Depression among Colorectal Cancer Patients (n=140)

Level	Anxiety n (%)	Depression n (%)
Normal (0–7)	0 (0.0%)	0 (0.0%)
Borderline abnormal (8–10)	3 (2.1%)	2 (1.4%)

Abnormal/case (11–21)	137 (97.9%)	138 (98.6%)
Mean ± SD	14.26 ± 1.92	13.86 ± 1.77
Range	10–21	10–19

As shown in Table 5, no statistically significant associations were observed between fatigue severity and usual bedtime (p=0.056), time to fall asleep (p=0.118), or usual wake-up time (p=0.079). However, actual sleep duration was significantly associated with fatigue severity (p<0.001). The proportion of patients with severe fatigue was highest among those reporting ≤2 hours of sleep per night (98.8%), compared with 69.4% among those reporting 3–4 hours and 60.0% among those reporting 5–6 hours. These findings suggest that the amount of actual sleep obtained was more closely associated with fatigue severity than the reported timing of sleep and wakefulness..

Table 5: Association Between Sleep Schedule Disturbance and Fatigue Severity (N = 140)

Sleep characteristic	Moderate fatigue n (%)	Severe fatigue n (%)	Total n (%)	p-value
Usual bedtime				
Before 11:00 PM	4 (14.8)	23 (85.2)	27 (100.0)	**0.056**
11:00 PM	8 (27.6)	21 (72.4)	29 (100.0)	
12:00 AM (midnight)	8 (9.5)	76 (90.5)	84 (100.0)	
Time to fall asleep				
≤30 minutes	2 (9.1)	20 (90.9)	22 (100.0)	
31–60 minutes	17 (19.8)	69 (80.2)	86 (100.0)	**0.118**
61–90 minutes	0 (0.0)	3 (100.0)	3 (100.0)	
>90 minutes	1 (3.4)	28 (96.6)	29 (100.0)	
Usual wake-up time[a]				
Before 6:00 AM	1 (50.0)	1 (50.0)	2 (100.0)	
06:00 AM	7 (9.2)	69 (90.8)	76 (100.0)	**0.079**
7–8 AM	3 (21.4)	11 (78.6)	14 (100.0)	
≥9:00 AM	1 (50.0)	1 (50.0)	2 (100.0)	
Actual sleep hours per night				
≤2 hours	1 (1.2)	80 (98.8)	81 (100.0)	**<0.001**
3–4 hours	15 (30.6)	34 (69.4)	49 (100.0)	
5–6 hours	4 (40.0)	6 (60.0)	10 (100.0)	

Table 6 shows that severe fatigue was observed across all sleep-disturbance frequency categories, ranging from 84.5% among participants reporting sleep disturbance 1–2 times per week to 100.0% among those reporting it less than once per week or three or more times per week. However, the association between sleep-disturbance frequency and fatigue severity was not statistically significant (p = 0.370)

Table 6: Association Between Sleep Disturbance Level and Fatigue Severity (N = 140)

Sleep disturbance frequency	Moderate fatigue n (%)	Severe fatigue n (%)	Total n (%)	P-Value
< 1 time/week	0 (0.0)	9 (100.0)	9 (100.0)	0.370
1–2 times/week	20 (15.5)	109 (84.5)	129 (100.0)	
≥ 3 times/week	0 (0.0)	2 (100.0)	2 (100.0)	
Total	20 (14.3)	120 (85.7)	140 (100.0)	

Table 7 shows that severe fatigue was reported by 84.5% of participants with good subjective sleep quality, 93.3% of those with fairly bad sleep quality, and 78.4% of those with very bad sleep quality. The association between subjective sleep quality and fatigue severity was not statistically significant (p = 0.147).

Table 7: Association Between Sleep Quality and Fatigue Severity (N = 140)

Subjective sleep quality	Moderate fatigue n (%)	Severe fatigue n (%)	Total n (%)	P-Value
Good	9 (15.5)	49 (84.5)	58 (100.0)	0.147
Fairly bad	3 (6.7)	42 (93.3)	45 (100.0)	
Very bad	8 (21.6)	29 (78.4)	37 (100.0)	
Total	20 (14.3)	120 (85.7)	140 (100.0)	

Table 8 shows that difficulty maintaining enough enthusiasm to get things done was significantly associated with fatigue severity (p=0.005). Severe fatigue was reported by 88.3% of patients who considered this a very big problem, compared with 58.3% of those who considered it somewhat of a problem. In contrast, the use of medication to aid sleep (p=0.077) and trouble staying awake during activities (p=0.273) were not significantly associated with fatigue severity.

Table 8: Association Between Sleep Medication Use/Daytime Functioning and Fatigue Severity (N = 140)

Sleep-related factor	Moderate fatigue n (%)	Severe fatigue n (%)	Total n (%)	p-value
Use of medication to help sleep				**0.077**
Not during the past month	16 (21.1)	60 (78.9)	76 (100.0)	
<1 time/week	4 (8.2)	45 (91.8)	49 (100.0)	
1–2 times/week	0 (0.0)	14 (100.0)	14 (100.0)	
≥3 times/week	0 (0.0)	1 (100.0)	1 (100.0)	
Trouble staying awake during activities				**0.273**
Not during the past month	1 (14.3)	6 (85.7)	7 (100.0)	
<1 time/week	13 (19.1)	55 (80.9)	68 (100.0)	
1–2 times/week	6 (11.8)	45 (88.2)	51 (100.0)	
≥3 times/week	0 (0.0)	14 (100.0)	14 (100.0)	

Difficulty maintaining enough enthusiasm				**0.005**
Somewhat of a problem	5 (41.7)	7 (58.3)	12 (100.0)	
A very big problem	15 (11.7)	113 (88.3)	128 (100.0)	

Table 9 shows that severe fatigue was observed across all sociodemographic categories, with proportions ranging from 50.0% to 100.0%. No statistically significant associations were found between fatigue severity and age (p = 0.901), gender (p = 0.135), marital status (p = 0.297), education (p = 0.251), occupation (p = 0.308), residential area (p = 0.394), smoking status (p = 0.180).

Table 9: Association Between Sociodemographic Characteristics and Fatigue Severity (N = 140)

Sociodemographic characteristic	**Category**	**Moderate fatigue n (%)**	**Severe fatigue n (%)**	**Total n (%)**	**p-value**
Age (years)	≤39	2 (10.5)	17 (89.5)	19 (100.0)	
	40–49	5 (14.3)	30 (85.7)	35 (100.0)	
	50–59	7 (18.9)	30 (81.1)	37 (100.0)	**0.901**
	60–69	3 (11.5)	23 (88.5)	26 (100.0)	
	≥70	3 (13.0)	20 (87.0)	23 (100.0)	
Gender	Male	11 (11.3)	86 (88.7)	97 (100.0)	**0.135**
	Female	9 (20.9)	34 (79.1)	43 (100.0)	
Marital status	Never married	0 (0.0)	2 (100.0)	2 (100.0)	
	Married	19 (14.0)	117 (86.0)	136 (100.0)	**0.297**
	Widowed	1 (50.0)	1 (50.0)	2 (100.0)	
Education level	Cannot read and write	4 (9.1)	40 (90.9)	44 (100.0)	
	Primary	10 (23.3)	33 (76.7)	43 (100.0)	
	Secondary	4 (9.5)	38 (90.5)	42 (100.0)	**0.251**
	Diploma	2 (22.2)	7 (77.8)	9 (100.0)	
	College/university	0 (0.0)	2 (100.0)	2 (100.0)	
Occupation	Employed	2 (33.3)	4 (66.7)	6 (100.0)	
	Self-employed	8 (11.8)	60 (88.2)	68 (100.0)	
	Unemployed	2 (7.7)	24 (92.3)	26 (100.0)	**0.308**
	Retired	0 (0.0)	2 (100.0)	2 (100.0)	
	Housewife	8 (21.1)	30 (78.9)	38 (100.0)	
Residential area	Urban	17 (13.4)	110 (86.6)	127 (100.0)	
	Suburban	1 (14.3)	6 (85.7)	7 (100.0)	**0.394**
	Rural	2 (33.3)	4 (66.7)	6 (100.0)	
Smoking status	Never smoked	14 (16.5)	71 (83.5)	85 (100.0)	
	Current smoking	1 (50.0)	1 (50.0)	2 (100.0)	**0.18**
	Ex-smoker	5 (9.4)	48 (90.6)	53 (100.0)	
Total		**20 (14.3)**	**120 (85.7)**	**140 (100.0)**	

Table 10 showed that severe fatigue was prevalent across the clinical characteristics examined. A statistically significant association was observed between cancer stage and fatigue severity (p = 0.012). Severe fatigue was reported by 91.8% of patients with Stage III disease and 85.4% of those with Stage IV disease, compared with 62.5% of patients with Stage II disease. However, the small numbers of patients in Stage I (n = 1) and Stage II (n = 8) warrant cautious interpretation of this finding.

No statistically significant associations were found between fatigue severity and type of colorectal cancer (p = 0.768), time since diagnosis (p = 0.102), current treatment phase (p = 0.756), current treatment (p = 0.523), number of chemotherapy cycles (p = 0.348), BMI category (p = 0.438), comorbidities (p = 0.945), functional performance status (p = 0.565), or average pain during the previous week (p = 0.526). Although severe fatigue was common across these clinical characteristics, the observed differences did not reach statistical significance in this sample.

Table 10: Association Between Clinical Characteristics and Fatigue Severity Among Colorectal Cancer Patients (N = 140)

Clinical characteristic	Category	Moderate fatigue n (%)	Severe fatigue n (%)	Total n (%)	p-value
Type of colorectal cancer	Colon	13 (13.7)	82 (86.3)	95 (100.0)	0.768
	Rectal	7 (15.6)	38 (84.4)	45 (100.0)	
Stage of cancer	Stage I	1 (100.0)	0 (0.0)	1 (100.0)	**0.012***
	Stage II	3 (37.5)	5 (62.5)	8 (100.0)	
	Stage III	4 (8.2)	45 (91.8)	49 (100.0)	
	Stage IV	12 (14.6)	70 (85.4)	82 (100.0)	
Time since diagnosis	<6 months	9 (15.5)	49 (84.5)	58 (100.0)	0.102
	6–12 months	3 (6.4)	44 (93.6)	47 (100.0)	
	>1 year	8 (22.9)	27 (77.1)	35 (100.0)	
Current treatment phase	During active chemotherapy	14 (13.7)	88 (86.3)	102 (100.0)	0.756
	Between chemotherapy	6 (15.8)	32 (84.2)	38 (100.0)	
Current treatment	Chemotherapy	4 (10.8)	33 (89.2)	37 (100.0)	0.523
	Chemotherapy and radiotherapy	1 (33.3)	2 (66.7)	3 (100.0)	
	Chemotherapy and surgery	15 (15.0)	85 (85.0)	100 (100.0)	
Number of chemotherapy cycles received†	≤12 cycles	12(14.3)	72 (85.7)	84 (100.0)	0.348
	13–24 cycles	6 (12.0)	44(88.0)	50(100.0)	
	≥25 cycles	2(33.3)	4(66.7)	6(100.0)	
	Severe pain	13 (12.6)	90 (87.4)	103 (100.0)	
BMI category	Underweight	0 (0.0)	2 (100.0)	2 (100.0)	0.438
	Normal weight	5 (9.3)	49 (90.7)	54 (100.0)	
	Overweight	10 (16.4)	51 (83.6)	61 (100.0)	

	Obesity	5 (21.7)	18 (78.3)	23 (100.0)	
Comorbidities	Yes	9 (14.5)	53 (85.5)	62 (100.0)	0.945
	No	11 (14.1)	67 (85.9)	78 (100.0)	
Functional performance status	Fully active	1 (50.0)	1 (50.0)	2 (100.0)	0.565
	Restricted in strenuous activity	9 (14.3)	54 (85.7)	63 (100.0)	
	Ambulatory but unable to work	6 (15.0)	34 (85.0)	40 (100.0)	
	Limited self-care	4 (13.3)	26 (86.7)	30 (100.0)	
	Completely bedridden	0 (0.0)	5 (100.0)	5 (100.0)	
Average pain during the past week	Mild pain (1–3)	1 (14.3)	6 (85.7)	7 (100.0)	0.526
	Moderate pain (4–6)	12 (17.6)	56 (82.4)	68 (100.0)	
	Severe pain (7–10)	7 (10.8)	58 (89.2)	65 (100.0)	
Total		**20 (14.3)**	**120 (85.7)**	**140 (100.0)**	

DISCUSSION

Sociodemographic and clinical profile

The mean age of the participants was 53.91 ± 13.14 years, indicating that the study population was predominantly composed of middle-aged adults. This finding is broadly comparable with regional evidence, including a Saudi tertiary-hospital study that reported a mean age of 56.3 ± 14.98 years (Ayyub et al., 2002). The predominance of males (69.3%) in the present study is comparable with the male predominance reported among colorectal cancer patients in Jordan, where males accounted for 56.0% of registered cases (Sharkas et al., 2017). However, the higher proportion observed in the present study may reflect differences in study setting, population characteristics, and case composition.The high proportion of married participants (97.1%) and the relatively low educational attainment of the sample were also comparable with demographic characteristics reported in regional cancer populations (Batiha et al., 2015; Khatatbeh et al., 2018).

Colon cancer was more common than rectal cancer in the present study, accounting for 67.9% and 32.1% of cases, respectively. A similar distribution has been reported in Jordan, where colon cancer represented approximately two-thirds of registered colorectal cancer cases (Sharkas et al., 2017). A notable finding was the high proportion of patients presenting with advanced disease, with 93.6% diagnosed at Stage III or IV. Similar patterns of advanced presentation have been reported in Jordan, where late-stage diagnosis has been discussed in relation to barriers to early detection and screening (Sharkas et al., 2017; El Muhtaseb et al., 2025). The mean BMI was 26.56 ± 4.62 kg/m², placing the sample within the overweight category. This finding is consistent with evidence linking excess body weight with an increased risk of colorectal cancer (Ungvari et al., 2025).

Pain was also highly prevalent, with 95.0% of participants reporting moderate-to-severe pain and a mean pain score of 6.14 ± 1.73. This represents a substantial symptom burden compared with estimates reported across broader cancer populations (van den Beuken-van Everdingen et al., 2016). The high prevalence of pain in the present sample may partly reflect the advanced clinical characteristics of the participants; however, the cross-sectional design does not permit causal interpretation.

Cancer-related fatigue

The mean total CFS score was 37.31 ± 2.66 out of 45, indicating a high overall burden of fatigue. Physical fatigue had the highest mean subscale score (18.17 ± 1.54), followed by affective fatigue (10.66 ± 1.12) and cognitive fatigue (8.47 ± 1.58). The predominance of physical fatigue is consistent with longitudinal evidence showing substantial fatigue among patients with colorectal cancer during chemotherapy (Xian et al., 2021). The high fatigue burden observed in the present study also appears greater than prevalence estimates reported across broader cancer populations; however, direct comparisons should be

interpreted cautiously because estimates vary according to cancer type, treatment status, assessment instrument, and the definition or threshold used to classify fatigue (Ma et al., 2020; Wang et al., 2014).

No statistically significant associations were identified between fatigue severity and the examined sociodemographic characteristics, including age, gender, marital status, education, occupation, residential area, and smoking status. Similar findings have been reported in cancer populations in Jordan, where fatigue was observed across different demographic groups (Al Qadire and Al Khalaileh, 2016). However, differences between studies may reflect variation in cancer type, treatment status, fatigue measurement, and sample characteristics.

Cancer stage was the only clinical characteristic significantly associated with fatigue severity in the present study ($p = 0.012$). Severe fatigue was reported by 91.8% of participants with Stage III disease and 85.4% of those with Stage IV disease. These findings are broadly consistent with evidence indicating that fatigue may vary according to disease and treatment characteristics among patients with colorectal cancer (Li et al., 2023; Xian et al., 2021). Nevertheless, the very small numbers of patients with Stage I and Stage II disease require cautious interpretation of this association.

No statistically significant associations were observed between fatigue severity and pain, BMI, comorbidities, functional performance status, treatment phase, treatment modality, or time since diagnosis. The absence of significant associations with pain and functional status may partly reflect the generally high symptom burden in this sample, which could have limited variability between participants. Previous research has demonstrated relationships between fatigue and physical or clinical factors, although these associations are not consistently observed across cancer populations (van Baar et al., 2021; Li et al., 2023). Therefore, the lack of statistical significance in the present study should not be interpreted as evidence that these factors are clinically unrelated to fatigue.

Sleep-related factors

Among the sleep-related variables, actual sleep duration was significantly associated with fatigue severity ($p < 0.001$), whereas usual bedtime ($p = 0.056$), time to fall asleep ($p = 0.118$), usual wake-up time ($p = 0.079$), sleep-disturbance frequency ($p = 0.370$), and sleep quality ($p = 0.147$) were not significantly associated with fatigue severity. Although the association between usual bedtime and fatigue severity approached statistical significance, it did not meet the conventional significance level of $p < 0.05$. Severe fatigue was reported by 98.8% of participants who reported sleeping ≤2 hours per night, compared with 69.4% of those sleeping 3–4 hours and 60.0% of those sleeping 5–6 hours. These findings suggest that, in this sample, the amount of sleep actually obtained was more closely associated with fatigue severity than sleep timing or sleep-onset latency.

These findings are consistent with previous evidence demonstrating an association between sleep quality and fatigue among colorectal cancer survivors during the first two years after treatment (Legg et al., 2022). Similar relationships between sleep-related problems and fatigue have also been reported in other cancer populations (Kırca et al., 2025). However, the present findings should be interpreted in the context of differences in assessment procedures, cut-off points, sample characteristics, and clinical settings across studies. In addition, because sleep and fatigue may influence each other bidirectionally, the cross-sectional design of the present study does not allow the direction or causality of the observed association between sleep duration and fatigue severity to be determined. Longitudinal studies are therefore needed to clarify the temporal relationship between sleep duration, sleep disturbances, and fatigue among colorectal cancer patients.

Regarding sleep medication use and daytime functioning, neither the use of medication to aid sleep ($p = 0.077$) nor trouble staying awake during activities ($p = 0.273$) was significantly associated with fatigue severity. However, difficulty maintaining enough enthusiasm to get things done was significantly associated with fatigue severity ($p = 0.005$). Severe fatigue was reported by 88.3% of participants who considered this a very big problem, compared with 58.3% of those who considered it somewhat of a problem. This finding may indicate that reduced daytime motivation or functioning is related to greater fatigue severity in this population. Nevertheless, the results should be interpreted cautiously because some categories contained very small numbers of participants, which may produce unstable percentages and reduce the reliability of statistical comparisons.

Psychological distress

The HADS findings indicated a very high level of reported psychological distress, with probable case-range scores observed in 97.9% of participants for anxiety and 98.6% for depression. These proportions are considerably higher than the range of anxiety

and depression prevalence reported among patients with colorectal cancer in previous studies (Peng et al., 2019; Gray et al., 2014). The difference may partly reflect the advanced disease profile and high symptom burden of the present sample; however, methodological factors, including differences in assessment procedures, cut-off points, sample characteristics, and clinical setting, should also be considered.

The item-level findings demonstrated frequent reports of tension, apprehension, difficulty relaxing, reduced enjoyment, diminished cheerfulness, psychomotor slowing, and reduced interest in previously enjoyable activities. These findings are broadly consistent with the psychological symptom burden reported among patients with colorectal cancer (Gray et al., 2014; Peng et al., 2019). Anxiety and depression may also coexist with fatigue and other cancer-related symptoms, highlighting the importance of considering psychological distress when assessing patients with substantial fatigue.

CONCLUSIONS

Cancer-related fatigue is a near-universal and severe symptom among colorectal cancer patients in Erbil city and is closely intertwined with pain and functional decline, psychological distress, and profound sleep disruption. These findings underscore the urgent need for routine, multidimensional fatigue screening as a standard component of oncology nursing assessment in this region.

Further research, including longitudinal and interventional studies, is needed to establish causal pathways and to test the effectiveness of nursing-led interventions for cancer-related fatigue in this and similar under-studied regional populations.

ETHICAL CONSIDERATIONS

Ethical approval was obtained from the Ethical Committee of the College of Nursing, Hawler Medical University, and administrative approval was obtained from the Directorate of Health in Erbil. Informed consent was obtained from each participant prior to data collection, in accordance with the approved study protocol.

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CONFLICT OF INTEREST

The authors have declared that there is no conflict of interest.

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