

# Pain, Sleep Disturbance, and Quality of Life Among Palestinian Patients Diagnosed with Cancer

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**Abstract** The objective of this descriptive study is to explore the relationships between pain, sleep disturbance, and quality of life among Palestinian patients diagnosed with cancer in the West Bank. A cross-sectional, descriptive-correlational design was used to collect data from 184 patients with cancer. The quality of life questionnaire, visual analogue pain scale, and physical health status were used in data collection. The results showed that the mean score for pain was 5, the best functioning was for cognitive scale ( $M=75$ ,  $SD=29$ ), the worst symptoms experienced by patients was appetite loss ( $M=47$ ,  $SD=35$ ), a moderate global health status ( $M=53$ ,  $SD=27$ ), and the mean for sleep disturbance was 43 ( $SD=35$ ). Pain and sleep disturbance showed high negative correlations with functional scales of quality of life and positive with symptom scales. The findings showed that the co-occurrence of pain and sleep disturbance was negatively correlated with quality of life (QoL) and positively with symptom scales. The regression analysis revealed that pain and sleep disturbance accounted for a significant proportion of variance in the QoL ( $p<0.001$ ), and the highest proportion was in predicting global health status (41.9 %). The findings of this study give evidence about the importance of assessing pain and sleep quality among Palestinian patients with cancer.

**Keywords** Cancer · Pain · Palestine · Quality of life · Sleep disturbances

## Introduction

Cancer is a leading cause of death worldwide. Globally, it causes 8.2 million deaths every year, accounting for 13 % of all deaths [1]. Lung, stomach, colon, breast, and prostate cancer are the most common types of cancer worldwide [2]. In spite of increasing incidence of cancer, there are evidences that survival rate is improving in the last few years that might be related to advancement in cancer treatment and related preventive and health promotion services [3]. Studies report that by the year 2050, there will be a further 40 % increase in the number of people living with cancer [3]. Cancer is a multifaceted disease that has serious consequences on individual's physical and psychosocial life [1]. Patients with cancer suffer a number of physical and psychological disturbances such as pain, depression, and sleep problems that negatively affect their way of living and perception of their lives [1]. The steady improvement in survival rate for cancer, however, highlighted the importance of holistic and integrated health-care services to manage the physical and psychosocial deterioration in patients' health. Thus, health professionals and researchers were concerned lately about the impact of cancer on patients' quality of life (QoL) as indicators of integrated care services [4]. Further, health-care professionals had also signified the factors that may influence QoL of patients diagnosed with cancer giving the facts that long survival with cancer requires understanding of the biopsychosocial aspect of health and well-being [4]. The treatment process of those patients whether for cure or to enhance their survival may distort their lives further [4]. Treatment plans that aim at adding more years to patients' lives may interfere with their ability to manage their

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life appropriately, resulting in further deterioration and low perception of their QoL [5]. Thus, patients' QoL is compromised as a result of the disease process or treatment plans [4].

Patients with cancer are subject to a number of health problems that are physical and psychological in nature [6]. Studies showed that disturbed sleep and high levels of pain were common among patients with cancer [7]. The significance of these problems is mainly related to its profound impact on patient's physical, physiological, emotional, social, and spiritual well-being that, consequently, deteriorates patients' QoL [8]. Pain has been reported as one significant psychological element that is an inevitable concern and a problem that patients with cancer are suffering on a daily base [7]. About 30 % of patients with cancer are suffering pain at the time of diagnosis, and this rate increases to 90 % as the disease progresses due to consequences of the tumor process making pain due to cancer systematic, pervasive, and enduring [7, 9]. The association of pain and its consequences on the physical and psychological stability of patients has been established in the literature, and showed significant association with low perception of QoL [7, 8, 10]. Maio and colleagues [11] reported that 50 % of patients diagnosed with cancer in their study reported that pain affected their daily activities and decreased their mean global QoL from 65 to 36.5 %. Such report infers that pain is one significant factor influencing QoL and functional ability among patients with cancer. Thus, pain is one significant component that needs to be assessed and controlled throughout the health-care process. Another factor that may interfere with QoL among patients with cancer is sleeping problems. Studies showed that sleep disturbances are common among patients diagnosed with lung and breast cancer [12]. Nocturnal sleeping and daytime wakefulness were found to be very important for health and functioning for patients with cancer [13]. Sleep disturbance has negative impact on the physical, cognitive performance, and motor function of individuals diagnosed with cancer [14]. Cancer and its treatment modalities affect the quality of sleep leading to low mood, cognitive function that are assumed to compromise patients' QoL [15]. Vena and colleagues [16] found that patients with lung cancer had more disturbances in nocturnal sleep compared to healthy adults, and that sleep disturbances associated with poor QoL.

The World Health Organization [1] reported that the Eastern Mediterranean Region is witnessing a growing incidence of cancer in the coming 15 years. The figures are considered alarming to those interested in improving care to patients diagnosed with cancer. In Palestine, cancer is the second leading cause of death among those at age of 20–59 [17]. The Palestinian and regional literature reports that cancer incidence is increasing, and mortality rates seem significant especially among women [4, 5, 17]. The treatment of cancer such as chemotherapy and radiotherapy may compromise QoL for patients [5]. Patients with cancer are subject to

deteriorations in physical and psychological health status such as pain and sleep disturbance that may deteriorate patients' ability to manage and function normally [8–10]. Previous studies showed that such physical and psychological symptoms will jeopardize patients' functionability, causing negative impact on their QoL [7, 9]. This calls professionals caring for patients with cancer to adopt and integrate a model of care that requires more attention to patients' QoL and its correlated factors. Palestine, unlike other countries of the work due to political restrains, suffers a dearth of knowledge and information related to such correlates. Although other studies in the regions have been found to address such issue [18], this study could be among the rare ones that addressed the bio-psychological factors of Palestinian patients diagnosed with cancer. In the region, a number of studies had emphasized the psychosocial wellbeing of patients with chronic illnesses neglecting those diagnosed with cancer [18–20]. The study expands our knowledge about the interrelationship among these factors within the Palestinian context. Therefore, the purpose of this study was to explore the relationships between pain, sleep disturbance, and QoL among Palestinian patients diagnosed with cancer in The West Bank, Palestine. The study is also emphasizing the effect of specific demographic characteristics on patients' perception of their QoLs and assessing prediction power of pain and sleep disturbance on quality of life among the patients.

## Methods

### Design

The study utilized a cross-sectional, descriptive-correlational design. Data was elicited from the participants using a self-reported questionnaires format. The study utilized well-established, reliable, and valid measures.

### Sample and Settings

All Palestinian patients diagnosed with cancer represented the population of this study. A convenience sampling technique was used to recruit the subjects. Potential participants were all patients who were admitted to the oncology units or to the day care of the selected health institutions with confirmed medical diagnosis of the first five types of cancer that are lung, breast, stomach, colon, and prostate cancer. The literature focused either on one type of cancer or the general types of cancer. Furthermore, these types of cancer were recruited in order to make comparison across demographic, clinical, pain,

sleep disturbance, and QoL variables. Inclusion criteria were (1) aged 18 years or older, (2) able to read and write Arabic, and (3) who is undergoing or receiving chemotherapy. The patients were excluded if they (1) have comorbid diseases such as lung, heart, or any chronic diseases as they could affect the perceived QoL for patients with cancer; (2) have a history of a second primary tumor; and (3) are receiving medications for pain or sleep disturbance as they could affect the participant's response regarding them. The two health-care centers, in the West Bank, that mainly provide care to patients with cancer were targeted to be representative of the sample. The first center is in the south, and the second one is in the north of the West Bank. The two centers are governmental hospitals and provide chemotherapy and surgeries as modalities for the management of patients with cancer. Human participants' right to confidentiality, privacy, and safety were securely protected throughout the project. Prior to data collection, ethical approval was obtained from the targeted institutions.

### Measures: the Study Used the Following Measures

1. The Visual Analogue Pain Scale (VAS) [21] was used to measure pain. It is an instrument that measures the amount of pain that a patient feels and ranges across a continuum from none to an extreme amount of pain. The VAS is a 100-mm horizontal line, with two anchors at the left and right end; the anchor of the left end is marked by no pain, and the right anchor is the worst pain imaginable. Each participant was asked to assign a number on this line from 0 to 10 corresponding to the pain intensity that he/she feels at the moment. The VAS is a reliable and well-validated measure of pain intensity in patients with cancer [22].

2. The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-C30 (EORTC-C30) was established to measure QoL in patients with cancer [23]. In this study, the EORTC-C30 version-3 scale was used to measure QoL. The EORTC-C30 is a cancer-specific tool with 30 items which were designed to assess health functions, individual symptoms, and global health status. Patients were asked to respond to each item of the EORTC-C30 on a Likert-type scale ranging from 1 to 4 except the last two items which ranges from 1 to 7. The range of the EORTC-C30 scores is between 0 and 100. A high score for the functional subscale represents a high level of functioning, a high score for the global health status represents high QoL, but a high score for a symptom scale represents a high level of symptomatology. The EORTC-C30 is a highly validated and reliable measure [24]. The Arabic version of EORTC-C30 was used in this study, and the Cronbach's alpha for all dimensions of EORTC-C30 were above 0.65.

3. The Nottingham Health Profile (NHP) was used to measure subjective physical, emotional, and social aspects of health [25]. Part I of the survey measures six dimensions of health including physical mobility, pain, social isolation, emotional reactions, energy, and sleep. Between three and eight items are associated with each dimension. Part II of the survey consists of Yes/No statements about seven areas of life that are most affected by health status [25]. For the purpose of this study, sleep items of the NHP was used to measure sleep disturbance. Scores range from 0 to 100. A higher score indicates a poor sleep [25].

### Data Collection Procedure

Prior to data collection, ethical approval was obtained from the targeted institutions. Head of institutions and research coordinators facilitated approaching subjects and invited them to the study. Those who expressed interest in participation were approached by the researcher who explained the study, purposes, its significance, and what is expected from them. The eligible participants were asked to read the cover letter. The cover letter included information about the purpose of the study, its significance, confidentiality of their responses, and a statement that they can withdraw at any time without any consequences. Data collection was conducted during patients' visits to the health center, and prior to their chemotherapy sessions. Participants were instructed that their completion of the questionnaires will be considered as an approval to participate. Finally, the researcher reviewed the participants' medical records to extract the required information after their approval.

### Data Analysis

Data was analyzed using Statistical Package for Social Sciences (SPSS) software program version 19. Alpha was set at 0.05. Descriptive statistics were used to characterize the sample, pain, sleep disturbance, and measures of QoL. Regarding inferential statistics, Pearson's  $r$  correlation was used to measure the correlation among pain, sleep disturbance, and QoL.  $t$  test and ANOVA were used to assess the differences in demographic and clinical characteristics regarding the QoL. Finally, multiple linear regressions were used to examine sleep disturbance and pain in the prediction of QoL.

## Results

### Patient Characteristics

As shown in Table 1, female participants were 56.5 % ( $n=104$ ) compared with males 43.5 % ( $n=80$ ) among

**Table 1** Demographic characteristics of the sample ( $n=184$ )

Variable	Number	Percent	<i>M</i>	<i>SD</i>	<i>P</i> <sub>50</sub>	Min	Max
Age (years)	–	–	53.5	15.2	55.0	20.0	83.0
Gender							
Male	80	43.5	–	–	–	–	–
Female	104	56.5					
Marital status							
Single	26	14.2	–	–	–	–	–
Married	131	71.2					
Divorced	10	5.4					
Widow	17	9.2					
Level of education							
High school or less	129	70.1	–	–	–	–	–
Diploma	21	11.4					
Baccalaureate	30	16.3					
Graduate	4	2.2					
Working status							
Unemployed	120	65.2	–	–	–	–	–
Full-time job	32	17.4					
Part-time job	13	7.1					
Retired	19	10.3					
Type of cancer							
Lung	35	19.0					
Breast	44	24.0	–	–	–	–	–
Colon	40	21.7					
Prostate	33	18.0					
Stomach	32	17.3					
Duration of diagnosis (months)	–	–	9	8	6	1	36
Hospitals							
North	88	48					
South	96	52					

the 184 participants. The average age of patients was  $53.5 \pm 15.2$ , 71.2 % ( $n=131$ ) of them were married, and 70.1 % ( $n=129$ ) had completed high school or less. Only 17.4 % ( $n=32$ ) were full-time employed compared with 65.2 % ( $n=120$ ) who were unemployed. The median for duration of diagnosis was 6 months. Forty-eight percent ( $n=88$ ) of the sample were recruited from the northern hospital and 52 % ( $n=96$ ) from the southern hospital (Table 1).

**Pain**

As shown in Table 2, the mean score for pain among patients with cancer measured by VAS was 5 ( $SD=2.8$ ). The scoring varies from 0 to 10. The range for the participants was 10. There were 25 % ( $n=46$ ) with a score less than 3 and 75 % ( $n=138$ ) less than 7. This indicated that majority of the participants had moderate pain or less.

**Table 2** Descriptive characteristics of the pain, sleep disturbance and quality of life functional scales, global health status, and symptom scales ( $n=184$ )

Variable	<i>M</i>	<i>SD</i>	Range	<i>P</i> <sub>25</sub>	<i>P</i> <sub>75</sub>
Pain	5.0	2.8	10	3.0	7.0
Sleep disturbance	43.0	34.6	100	12.6	77.6
Functional scales					
Physical functioning	60.0	31.0	100	33.0	87.0
Role functioning	65.0	31.0	100	50.0	100
Emotional functioning	67.0	27.0	100	50.0	92.0
Cognitive functioning	75.0	29.0	100	50.0	100
Social functioning	65.0	31.0	100	33.0	100
Global health status	53.0	27.0	100	33.0	73.0
Symptom scales					
Fatigue	45.0	29.0	100	22.0	67.0
Nausea and vomiting	37.0	33.0	100	0.0	67.0
Pain	42.0	27.0	100	17.0	67.0
Dyspnea	35.0	36.0	100	0.0	67.0
Insomnia	45.0	35.0	100	33.0	67.0
Appetite loss	47.0	35.0	100	33.0	67.0
Constipation	31.0	35.0	100	0.0	67.0
Diarrhea	26.0	33.0	100	0.0	33.0
Financial difficulties	41.0	57.0	100	0.0	67.0

**Quality of Life**

In relation to QoL, the analysis showed that the best functioning was for cognitive scale ( $M=75$ ,  $SD=29$ ) with scores ranging from 0 to 100 and the worst one was for physical functioning ( $M=60$ ,  $SD=31$ ). The analysis showed that 50 % ( $n=92$ ) of the patients had a score of 83 or above, indicating that most patients had a high cognitive functioning. On the other hand, 50 % ( $n=92$ ) of the patients had a score of 67 or less, indicating that many patients experience low to moderate physical functioning. The symptom scales also showed that the worst symptoms experienced by patients with cancer was appetite loss ( $M=47$ ,  $SD=35$ ). The analysis showed that 50 % ( $n=92$ ) of the patients had a score of 33 or above, indicating that most of the patients experienced loss of appetite. The best (lowest) one of the symptoms was diarrhea ( $M=26$ ,  $SD=33$ ) as 75 % of the sample ( $n=145$ ) had a score of 33 or less, and this indicates that the least symptom experienced by patients with cancer was diarrhea. The results showed a moderate global health status ( $M=53$ ,  $SD=27$ ). Regarding sleep disturbance, the mean was 43 ( $SD=35$ ). There are 50 % who had a score of 40 or above; this indicates that many patients had a sleep disturbance. The majority of the participants (64.1 %,  $n=118$ ) woke up in the early morning, and 33.7 % ( $n=62$ ) were taking pills to get sleep. Moreover, there are 42.4 % ( $n=78$ ) who stated that they lie awake for most of the night (Table 3).

**Table 3** Descriptive characteristics of sleep disturbance for participants who responded yes to each question ( $n=184$ )

Items	Frequency	Percentage
1. I take pills to help me sleep.	62	33.7
2. I'm waking up in the early hours of the morning.	118	64.1
3. I lie awake for most of the night.	78	42.4
4. It takes me a long time to get to sleep.	81	44.0
5. I sleep badly at night.	74	40.2

### Bivariate Analysis

Regarding gender differences, *t* test was used to assess the differences between males and females. The analysis showed significant differences between males and females regarding QoL, and pain. Statistically significant differences were found in four scales, pain ( $t=-2.38$ ,  $p=0.018$ ), cognitive functioning ( $t=3.69$ ,  $p<0.001$ ), social functioning ( $t=2.26$ ,  $p=0.025$ ), and financial difficulties ( $t=-2.44$ ,  $p=0.016$ ) with higher scores (more problems) for females across these scales. There were no statistically significant differences between the two hospitals across all variables ( $p>0.05$ ). Regarding types of cancer, one-way ANOVA was conducted; it was found that there were only statistically significant differences in nausea and vomiting ( $F=2.94$ ,  $p=0.022$ ), dyspnea ( $F=5.56$ ,  $p<0.001$ ), appetite loss ( $F=5.17$ ,  $p=0.001$ ), and marginally constipation ( $F=2.43$ ,  $p=0.049$ ). Post hoc analysis showed that lung cancer has the majority of these differences. Further analysis showed that there were no differences between types of cancer across other variables. Moreover, there were no significant differences between duration of diagnosis and types of cancer ( $F=2.263$ ,  $p=0.064$ ). Pearson's correlation was used to examine the correlations among pain, sleep disturbance, period of diagnosis, and QoL dimensions. As shown in Table 4, pain showed high negative correlations with physical functioning ( $r=-0.490$ ,  $p<0.001$ ) and global health status ( $r=-0.632$ ,  $p<0.001$ ). Sleep disturbance also showed high negative correlations with emotional functioning ( $r=-0.509$ ,  $p<0.001$ ) and positively correlated with loss of appetite ( $r=0.508$ ,  $p<0.001$ ). A statistically significant correlation between pain and sleep disturbance also existed ( $r=0.448$ ,  $p<0.001$ ). Regarding the period of diagnosis, there were no significant correlations between period of diagnosis, pain, and sleep disturbance ( $p>0.05$ ). On the other side, there were significant correlations between period of diagnosis and physical functioning ( $r=-0.23$ ), emotional functioning ( $r=-0.19$ ), and global health status ( $r=-0.17$ ). All relationships were negative correlations, indicating that the more period of diagnosis, the lower the physical, emotional, and global health status (Table 4). Regression analysis was performed to examine the contribution of pain and sleep disturbance in QoL. A two-step

multiple hierarchical regression analysis was performed. The demographic variables were entered in the first model and pain and sleep disturbance in the second model. The results showed that the demographic variables accounted for a significant proportion of variance across most of the functional, symptom scales of the QoL and global health status ( $p<0.05$ ). The results also showed that there was a significant inverse relationship when pain and sleep disturbance were regressed on QoL. The highest prediction was for global health status (42.6 %) and the lowest one was for diarrhea (6.2 %). In general, all models were significant (all  $p<0.05$ ) across all subscales of QoL except diarrhea. The results of regression were summarized in Table 5. The results implies that an increase in pain and sleep disturbance were associated with a decrease in all functional scales and global health status of QoL and associated with an increase in symptom scales (Table 5).

### Discussion

Patients with cancer tend to experience more and more signs and symptoms by time during the trajectory of the disease due to cancer or its treatment. The results of this study showed that a significant proportion of Palestinian patients with cancer have moderate pain, sleep disturbance, and QoL. As expected, there were no differences between the two settings regarding pain, sleep disturbance, or QoL. This could be due to the fact that both of them are governmental hospitals and caring for similar patients with cancer. The results of the current study regarding pain is corresponding with the literature that pain is one significant psychological problem among patients with cancer [26]. Pain is affected by many factors such as stage of disease, therapeutic modalities (i.e., chemotherapy, radiotherapy, or surgery), duration of diagnosis, and metastasis. The score of pain in this study varied across participants regarding the severity of pain. One possible explanation is that patients in this study varied in the period of diagnosis, severity, and methods of treatment that might have interfered with their level of reported pain. However, the wide range of duration of diagnosis leads to an average of moderate pain perceived by Palestinian patients with cancer. The results support previous works that high numbers of patients with cancer suffer from pain [27]. The differences between males and females in their reports of pain correspond with previous studies [26]. This may be attributed to the fact that females are more emotional and experienced signs and symptoms of the disease in a more intense way than males [28]. There were above 40 % of the sample who reported that they experienced problems in getting to sleep, lie awake most of the night, bad sleep at night, and waking up in the early morning. These results showed that sleep disturbance is a significant problem among patients with cancer. It was correlated positively with

**Table 4** Intercorrelations among pain, sleep disturbance, and quality of life subscales (n=184)

Variable	Pain	Sleep disturbance	Period of diagnosis
Functional scales			
PF	-0.49 <sup>a</sup>	-0.47 <sup>a</sup>	-0.23 <sup>a</sup>
RF	-0.32 <sup>a</sup>	-0.48 <sup>a</sup>	-0.12
EF	-0.42 <sup>a</sup>	-0.51 <sup>a</sup>	-0.19 <sup>b</sup>
CF	-0.34 <sup>a</sup>	-0.37 <sup>a</sup>	-0.11
SF	-0.28 <sup>a</sup>	-0.37 <sup>a</sup>	-0.06
GHS	-0.63 <sup>a</sup>	-0.43 <sup>a</sup>	-0.17 <sup>b</sup>
Symptom scales			
FA	0.45 <sup>a</sup>	0.52 <sup>a</sup>	0.24 <sup>a</sup>
NV	0.38 <sup>a</sup>	0.41 <sup>a</sup>	0.18 <sup>b</sup>
PA	0.48 <sup>a</sup>	0.49 <sup>a</sup>	0.19 <sup>a</sup>
DY	0.33 <sup>a</sup>	0.34 <sup>a</sup>	0.18 <sup>b</sup>
SL	0.39 <sup>a</sup>	0.61 <sup>a</sup>	0.17 <sup>b</sup>
AP	0.35 <sup>a</sup>	0.51 <sup>a</sup>	0.15 <sup>b</sup>
CO	0.26 <sup>a</sup>	0.30 <sup>a</sup>	0.01
DI	0.21 <sup>a</sup>	0.21 <sup>a</sup>	0.08
FI	0.23 <sup>a</sup>	0.24 <sup>a</sup>	0.14

PF physical functioning, RF role functioning, EF emotional functioning, CF cognitive functioning, SF social functioning, GHS global health status, FA fatigue, NV nausea and vomiting, PA pain, DY dyspnea, SL insomnia, AP appetite loss, CO constipation, DI diarrhea, FI financial difficulties

<sup>a</sup> Correlation is significant at the 0.01 level (2-tailed)

<sup>b</sup> Correlation is significant at the 0.05 level (2-tailed)

pain and symptom scales and negatively with functional scales of QoL and global health status. These results were consistent with previous researches [15]. Lin and colleagues [29] explored the common symptom among patients with lung cancer and found that 93 % complain from sleep disturbance. The discrepancies in the results could be due to the differences in the sample as Lin and colleagues had selected patients with lung cancer who had accepted surgical treatment. From the other side in this study, the top five types of cancer were included which may be responsible for this variety in the frequency of sleep disturbances. The results of this study show that the sample had a relatively moderate level of overall QoL. The moderate level of functional and symptom scales may be explained by the adverse effects of the disease symptoms on the patients or the treatment modalities. Patients with cancer tend to have better cognitive functioning than physical, social, emotional, and role functioning. Most of the patients with cancer suffer from appetite loss. On the other side, the least symptoms experienced by them were diarrhea and constipation. These results were consistent with other studies [30, 31]. Alacacioglu et al. [30] found that patients with lung cancer had moderate QoL with means ranged from 9 to 72; the lowest one was diarrhea, and the highest one was for cognitive functioning. There were approximately the same results also in the

**Table 5** Multiple hierarchical regressions to predict dimensions of quality of life from pain and sleep disturbance (n=184)

Variables	Pain		SD	
	$\beta$	t value	$\beta$	t value
PF	-3.898	-5.078**	-0.281	-4.591**
RF	-1.403	-1.723**	-0.380	-5.868**
EF	-2.341	-3.433**	-0.315	-5.807**
CF	-2.239	-2.854**	-0.226	-3.600**
SF	-1.695	-1.954**	-0.268	-3.888**
GHS	-5.369	-8.751**	-0.140	-2.860**
FA	2.768	3.918**	0.333	5.913**
NV	2.954	3.295**	0.294	4.118**
PA	3.194	4.774**	0.268	5.034**
DY	2.974	3.004**	0.239	3.032**
SL	1.868	2.235*	0.557	8.374**
AP	1.993	2.225*	0.441	6.183**
CO	2.042	1.929	0.248	2.938**
DI	1.795	1.838	0.139	1.785
FI	1.881	1.953	0.163	2.131*

SD sleep disturbance, PF physical functioning, RF role functioning, EF emotional functioning, CF cognitive functioning, SF social functioning, GHS global health status, FA fatigue, NV nausea and vomiting, PA pain, DY dyspnea, SL insomnia, AP appetite loss, CO constipation, DI diarrhea, FI financial difficulties

\*p<0.05; \*\*p<0.01

Safae et al. [32] study which assessed the QoL for patients with breast cancer. They found that the mean ranged from 4 to 72 for diarrhea and cognitive functioning, respectively. However, in another study, QoL was found to be low on all aspects; most of the dimensions of QoL were less than half of full function, and more severe symptoms were found [24]. The possible explanations for that were due to the sample characteristics; for example, the differences in duration of diagnosis, stage of cancer, presence of comorbidities and surgeries, and inclusion of more than one type of cancer could lead to this variability. Despite the differences in the types of cancer, many studies had found almost the same results regarding the symptom scales [33]. The present study found that pain was correlated positively with symptom scales and negatively with global health status and functional scales of QoL. Pain affected patients with cancer at all levels. Besides, pain increases the negative symptoms experienced by patients with cancer. This may be either related to tumor burden or to different treatment modalities. These findings were consistent with other studies [34]. Maio and colleagues [11] found that pain in patients with cancer correlated significantly with QoL, and high levels of pain correlated with low QoL while mild or low pain correlated with high QoL. It was also found that there was a reduction in the global QoL in patients with severe pain compared with patients who are free of pain. In another study,

Fujimura et al. [35] found that pain was related with a poor QoL score. There were also other studies that found more than 40 % of their samples to suffer from pain [36, 37]. The results also showed that there were significant correlations between period of diagnosis and QoL dimensions. The more the period of diagnosis, the less the functioning scales and the more the symptoms experienced by patients with cancer. This is consistent with a previous study [5]. On the other side, these results were contradictory with some studies as in Phipps et al. [38] who found that there were no significant correlations between period of diagnosis and QoL dimensions. However, this incongruity could be due to the sample characteristics as they recruited long-term colon cancer survivors. In relation to the general population norms, Costa-Requena and Gil [39] found that there were no significant differences between patients with cancer and the general population regarding QoL domains.

In consistent with the literature [27, 34], the results of the regression analysis showed that pain and sleep disturbance accounted for a significant proportion of variance in the QoL. The predictions were positive in symptom scales and negatively with functional scales and global health status. This study supports the premise that perceived pain and sleep disturbance lead to impairment across dimensions of QoL. These results support the previous work of Pud [27] who found pain as a significant predictor for QoL in patients with cancer.

The limitations in the current study are inclusion of more than one type of cancer. However, assessing many types of cancer allows for making comparisons among them. The descriptive design prevents assessment of causality. Although data collection was based on valid and reliable instruments, it is based on subjective reports of the quantity of the variables of the study. This may lead to overestimation or underestimation of these variables.

## Conclusion

The findings of this study showed that the co-occurrence of pain and sleep disturbance was negatively correlated with QoL and positively with symptom scales. Furthermore, female participants seem to experience more pain and sleep disturbance than male participants. Patients with lung cancer tend to experience more symptoms in intense ways compared with other types of cancer. These findings offered an evidence for health-care workers to include these variables in symptom assessment and to provide assistance and care for patients with cancer who had such symptoms.

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