

Original Paper


# The Pain Characteristics and Caregiver Burden in Patients With Cancer-related Pain and their Associated Factors: A Cross-sectional Study



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## ABSTRACT

**Introduction:** Pain is the most common symptom among patients with cancer; the pain also affects their caregivers.

**Objective:** This study aimed to explore the pain characteristics and caregiver burden in patients with cancer-related pain and their associated factors.

**Materials and Methods:** This cross-sectional study was conducted on 240 patients and their caregivers (120 patients and 120 caregivers), who were chosen using the convenience sampling method. They completed face-to-face surveys, including information about sociodemographic and disease characteristics, the brief pain inventory, the pain beliefs questionnaire, and the Zarit burden interview scale. The descriptive statistics, frequency distributions, and multiple linear regression model were used to analyze the obtained data according to the two-tailed  $P < 0.05$ .

**Results:** The mean age of the patients was  $58.79 \pm 13.46$  years, and 50.8% were females. The mean age of the caregivers was  $47.84 \pm 13.24$  years, and 83.3% were females. The linear regression analyses showed demographic and clinical factors of patients were associated with pain severity ( $R^2 = 0.326$ ,  $P < 0.001$ ). In addition, these factors were associated with all sub-dimension of pain interference and pain beliefs ( $P < 0.001$ ). Furthermore, the linear regression model showed that patients' pain severity, pain interference and pain beliefs were predictive factors of caregiver burden ( $R^2 = 0.266$ ,  $P < 0.001$ ).

**Conclusion:** These results will help health professionals understand the pain characteristics of patients and caregiver burden to improve cancer-related pain and caregiver burden.

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## Highlights

- Cancer-related pain is commonly a symptom in adults with cancer and results from multiple factors, such as organic or psychological.
- Additionally, cancer-related pain affects caregivers, and they experience physical, psychological, social, and economic problems.
- When health professionals better understand the characteristics of pain and caregiver burden, they can improve pain management and caregiver burden.

## Plain Language Summary

Adults with cancer commonly experience cancer-related pain and it also affects caregivers. Therefore, understanding the factors associated with cancer-related pain and caregiver burden is crucial in effective pain management and improving caregiver burden. This study showed that patients with cancer-related pain experienced mostly psychological pain and pain mostly affected patients' sleep and mood. Pain severity was associated with gender and the presence of metastasis. Pain interference was related to gender, duration of cancer, type of pain treatment, presence of metastasis, and type of cancer treatment. Organic pain beliefs were associated with the stage of cancer and the presence of metastasis, and psychological pain beliefs with gender, type of cancer treatment, and the presence of metastasis. In addition, the caregiver experienced mild caregiver burden. Caregiver burden was associated with education level, employment status, and caregiving impact on other responsibilities. Furthermore, pain interference sub-dimensions such as relations with other people, and pain beliefs sub-dimension such as organic pain beliefs were predictors of caregiver burden.

## Introduction

**P**ain is one of the most common symptoms of cancer and affects all patient aspects, including physical and mental health, daily life activities, quality of life, family and social relationships, and economic and employment [1-3]. Cancer-related pain encompasses different etiologies, characteristics, and pathological mechanisms. A tumor can pressure on bones, nerves, or other organs in the body, or pain is due to cancer treatment, or a combination of both [1, 2]. One meta-analysis reported that the prevalence of pain was 39.3% in patients after curative treatment, 55% in patients undergoing anticancer therapy, and 66.4% in patients with advanced, metastatic, or terminal disease [4]. Other studies have reported that 20%-50% of cancer patients experience some degree of pain, and 80% of patients with advanced cancer suffer from moderate or severe pain [2, 5, 6].

Pain assessment is a significant step in its management [1]. Pain assessment involves pain intensity, beliefs, and interference [2]. In addition, pain expression is influenced by the pain experiences and beliefs, gender, age, race, and emotional status [7]. Pain beliefs include

two dimensions: Organic and psychological [8]. Organic pain beliefs indicate the physiological experience of pain associated with physical harm or threat. Psychological pain beliefs are related to internal feelings and influences [8, 9]. Both of these factors may negatively affect beliefs about pain management. Therefore, assessment of pain beliefs is crucial in pain management. Moreover, a multidisciplinary team approach is needed in the pain beliefs assessment [10].

Cancer-related pain affects patients as well as their caregivers. The caregiver burden of cancer patients has been reported to be 37% to 68% [11-13]. Cancer care is a complex process that includes physical care, symptom management, and emotional support [14]. In this complex process, caregivers adjust their daily lives according to the patient's conditions, which may cause caregivers physical, psychological, social, and economic problems [15, 16]. All these problems increase the caregiver's burden. Therefore, a multidisciplinary approach, including caregivers and patients, is crucial in cancer management [17]. Pain management is an interdisciplinary team approach, and the nurses play an important role in this team. Nurses spend more time with patients than other health professionals. Therefore, nurses should

have sufficient knowledge and skills in pain mechanisms, assessment, care planning, and management [3, 18]. Nurses should support caregivers psychologically, socially, and spiritually [19].

Several studies have focused on the relationship between depression, anxiety, and cancer pain in patients with cancer [20-22]. However, a few studies have been conducted on the associated factors of pain characteristics of patients with cancer. Many studies assessed associations between demographic variables and pain severity or pain beliefs in patients with cancer without including patients experiencing pain in their studies [23, 24]. Additionally, many studies have evaluated the relationships between demographic variables and caregiver burden in caregivers of patients with cancer [11, 15, 25]. Therefore, we aimed to investigate the factors associated with pain characteristics such as intensity, interference, and beliefs in patients experiencing pain for at least one month due to cancer or cancer treatment and the factors associated with caregiver burden.

## Materials and Methods

This cross-sectional study was conducted on 120 patients with cancer and 120 their caregivers in the oncology unit of a publicly-funded hospital in a province in Turkey. The inclusion criteria for patients with cancer were as follows: Having pain for at least one month due to cancer or cancer treatment, being  $\geq 18$  years old, being willing to participate, lacking language or communication barriers, having no mental problems or visual or hearing impairment. The inclusion criteria for caregivers were as follows: Being  $\geq 18$  years old, willing to participate, lacking language or communication barriers, having mental problems, or visual or hearing impairment. The exclusion criterion for patients with cancer and caregivers was a diagnosis of psychiatric illness in them. In addition, we did not exclude patients with cancer using painkillers.

This study used a convenience sampling method. The sample size was calculated according to Yamane's sample size method. In the calculation, the population size consisted of 360 patients with cancer who were referred to the hospital where the study was conducted within one year. The precision/error margin level was 0.05 at a confidence level of 95%. According to these variables, the sample size was calculated as 189 patients with cancer-caregiver dyads. However, we reached 120 patients with cancer-their caregiver dyads between November 2011 and June 2012. The reasons included the unwillingness of some patients to participate in the

study, no pain for at least one month due to cancer or cancer treatment in some patients, and the allocated timeframe.

The data collection tools included a demographic and clinical/caregiving characteristics form for patients with cancer-related pain and their caregivers, the brief pain inventory (BPI), the pain beliefs questionnaire (PBQ), and the Zarit burden interview scale (ZBI). The patient's demographic and clinical characteristics form included 11 items: Age, gender, type, duration, stage of cancer, type of cancer treatment, presence of metastasis, the region of metastasis, the area of pain, accompanying symptoms to pain, and kind of pain treatment. The demographic and caregiving characteristics form for caregivers included 11 items: Age, gender, education, employment status, income level, kinship with the patients with cancer, other care recipients, caregiving time, getting support for care, the impact of caregiver on other responsibilities, and responsibilities affecting the caregiver.

The BPI was used to assess pain severity and interference for patients with cancer. It was developed by Cleland and Ryan [26]. It is an 11-item instrument to assess pain intensity and interference. Pain intensity evaluated participants' least, worst, and mean pain in the last 24 hours and their pain at the time of the survey on a scale of 0 (no pain) to 10 (worst imaginable pain). Pain interference was evaluated in seven areas: General activity, mood, walking ability, normal work, relations with other people, sleep, and enjoyment of life on a scale of 0 (no interference) to 10 (complete interference). The Turkish version of this scale was used in this study [27]. The Cronbach  $\alpha$  ranged from 0.90 to 0.98 in our study.

The BPQ was developed by Edwards et al. and used to assess pain beliefs in patients with cancer [28]. It consists of 12 items scored on a Likert scale from 0 (never) to 6 (always) and two sub-dimensions: Organic and psychological beliefs. The high score for each sub-dimension indicates that causal beliefs of pain are psychological or organic. The Turkish version of BPQ was used in this study [29]. The Cronbach  $\alpha$  value of each sub-dimension was found to be 0.80 in our study.

The ZBI was used to assess the care burden of caregivers. It was developed by Zarit et al. [30] and consists of 22 items scored on a Likert scale from 0 (never) to 5 (nearly always). The total score ranges from 0 to 88; a higher score indicates a greater burden. Scores are categorized as 0-20 as no care burden, 21-40 as mild, 41-60 as moderate, and 61-88 as severe [30]. The Turkish ver-

sion of the scale, which İnci and Erdem localized, was used in this study [31]. The Cronbach  $\alpha$  was found to be 0.77 in our study.

Data were collected by face-to-face interviews by the researcher and completed in approximately 30 minutes. The obtained data were analyzed with IBM SPSS for Windows version 25 [32]. The descriptive statistics, frequency distributions, and multiple linear regression model were used to analyze the data using the two-tailed  $P < 0.05$ . The independent t-test, one-way analysis of variance (ANOVA) and Pearson correlation analysis according to testing groups were used to analyze the relationship between demographic and clinical/caregiving characteristics and BPI, PBQ and ZBI scores. The demographic and clinical/caregiver variables that were found to be significant according to these tests were entered into the multiple linear regression model.

## Results

The mean age of the participants was  $58.79 \pm 13.46$  years. Of 120 patients, 61 were female (50.8%), and the most common cancer was colorectal cancer (30%). Abdominal pain was most common in cancer patients (55.8%). The mean age of the caregivers was  $47.84 \pm 13.24$  years. Of 120 caregivers, 100 were female (83.3%), 52 were literate (43.3%), 88 were unemployed (73.3%), and 55 had a spouse relationship with the patient (45.8%). Additionally, 51 caregivers had been caring for 0-6 months (42.5%), and 92 caregivers (76.7%) had their caring interfered with their other responsibilities. These results were shown in Table 1.

**Table 1.** Demographic and clinical/caregiving characteristics of adults with cancer-related pain and caregivers

| Variables              |  | Mean $\pm$ SD/No. (%) |
|------------------------|--|-----------------------|
| Age (y)                |  | 58.79 $\pm$ 13.46     |
| Gender                 | Male   | 59(49.2)              |
|                        | Female   | 61(50.8)              |
| Type of cancer         | Colon cancer   | 36(30.0)              |
|                        | Breast cancer  | 27(22.5)              |
|                        | Lung cancer  | 15(12.5)              |
|                        | Ovarian, endometrium, cervical cancer  | 11(9.2)               |
|                        | Nasopharyngeal, larynx, thymus, nasal adeno cancer                                       | 8(6.7)                |
|                        | Other (kidney, pancreas, Hodgkin lymphoma, biliary tract, leukemia, ileum, liver cancer) | 7(5.8)                |
|                        | Rectum cancer  | 5(4.2)                |
|                        | Soft tissue, malignant melanoma, squamous cell cancer                                    | 4(3.3)                |
|                        | Gastric cancer   | 3(2.5)                |
|                        | Prostate cancer  | 3(2.5)                |
| Duration of cancer (m) | Bladder cancer   | 1(0.8)                |
|                        | 0-12   | 51(42.5)              |
|                        | 13-36  | 38(31.7)              |
|                        | 37-60  | 11(9.2)               |
|                        | $\geq 61$  | 20(16.7)              |

|                               | Variables  | Mean±SD/No. (%) |
|-------------------------------|--|-----------------|
| Stage of cancer               | Stage I  | 20(16.7)        |
|                               | Stage II   | 30(25.0)        |
|                               | Stage III  | 33(27.5)        |
|                               | Stage IV   | 37(30.8)        |
| The type of cancer treatment  | Chemotherapy                                       | 20(16.7)        |
|                               | Chemotherapy and surgical treatment                | 69(57.5)        |
|                               | Chemotherapy, surgical treatment, and radiotherapy | 19(15.8)        |
|                               | Other treatments                                   | 12(10.0)        |
| Presence of metastasis        | No   | 37(30.8)        |
|                               | Yes  | 83(69.2)        |
| The region of metastasis      | Lung   | 20(16.7)        |
|                               | Liver  | 12(10.0)        |
|                               | Bone   | 7(5.8)          |
|                               | Brain  | 5(4.2)          |
|                               | Abdominal  | 3(2.5)          |
|                               | Breast   | 2(1.7)          |
|                               | Pancreas   | 1(0.8)          |
|                               | Vertebra   | 1(0.8)          |
| The region of pain            | Abdomen  | 67(55.8)        |
|                               | Breast   | 43(35.8)        |
|                               | Back   | 16(13.3)        |
|                               | Head   | 8(6.7)          |
|                               | Neck   | 3(2.5)          |
|                               | Hip  | 3(2.5)          |
| Accompanying symptoms of pain | Nausea   | 30(25.0)        |
|                               | Headache   | 10(8.3)         |
|                               | Weakness   | 6(5.0)          |
|                               | Anorexia   | 2(1.7)          |
| The type of pain treatment    | NSAI/Acetaminophen                                 | 74(61.7)        |
|                               | Weak opioids                                       | 30(25.0)        |
|                               | No analgesics                                      | 9(7.5)          |
|                               | Strong opioids                                     | 7(5.8)          |

| Variables for Caregivers                      |                              | Mean±SD/No. (%) |
|---|------------------------------|-----------------|
| Age (y)                                       |                              | 47.84±13.24     |
| Gender  | Male                         | 20(6.7)         |
|   | Female                       | 100(83.3)       |
| Education status                              | Illiterate                   | 23(19.2)        |
|   | Literate                     | 52(43.3)        |
|   | Primary                      | 7(5.8)          |
|   | Secondary                    | 27(22.5)        |
| Employment status                             | University/Postgraduate      | 11(9.2)         |
|   | Employed                     | 32(26.7)        |
|   | Unemployed                   | 88(73.3)        |
| Income level                                  | Income less than the expense | 31(25.8)        |
|   | Income is equal              | 89(74.2)        |
|   | Income more than the expense | 0               |
| Kinship with the patients with cancer         | Mother/Father                | 6(5.0)          |
|   | Spouse                       | 55(45.8)        |
|   | Daughter/Son                 | 40(33.3)        |
|   | Sibling                      | 13(10.8)        |
|   | Others                       | 6(5.0)          |
| Another care recipients                       | Yes                          | 54(45.0)        |
|   | No                           | 66(55.0)        |
| Caregiving time (m)                           | 0-6                          | 51(42.5)        |
|   | 7-12                         | 31(25.8)        |
|   | 13-36                        | 25(20.8)        |
|   | ≥37                          | 13(10.8)        |
| Getting support for care                      | Yes                          | 72(60.0)        |
|   | No                           | 48(40.0)        |
| Impact of caregiver on other responsibilities | Yes                          | 92(76.7)        |
|   | No                           | 28(23.3)        |
| Responsibilities affecting the caregiver      | Child care                   | 25(20.8)        |
|   | Domestic responsibilities    | 17(14.2)        |

NASI: Nonsteroidal anti-inflammatory drug.

**Table 2.** Regression coefficients for demographic and clinical factors associated with pain severity and pain interference in adults with cancer-related pain

| Model   | Unstandardized Coefficient                       |  |       |       | 95% CI |        |        |
|---|--|--|-------|-------|--------|--------|--------|
|   | B  | SE   | t     | P     | Lower  | Upper  |        |
| <b>Pain Severity</b>                          |  |  |       |       |        |        |        |
| Constant                                      | 5.46   | 1.771  | 3.08  | 0.003 | 1.957  | 8.974  |        |
| Gender  | -0.92  | 0.281  | -3.28 | 0.001 | -1.482 | -0.368 |        |
| Presence of metastasis                        | -1.56  | 0.553  | -2.82 | 0.006 | -2.661 | -0.469 |        |
| Model summary                                 | R=0.571, R <sup>2</sup> =0.326, F=7.748, P=0.001 |  |       |       |        |        |        |
| <b>Pain Interference</b>                      |  |  |       |       |        |        |        |
| Interference with general activities          | Constant   | 6.92   | 3.083 | 2.24  | 0.027  | 0.817  | 13.036 |
|   | Gender   | -1.28  | 0.490 | -2.62 | 0.010  | -2.258 | -0.317 |
|   | The type of pain treatment                       | 0.95   | 0.339 | 2.80  | 0.006  | 0.280  | 1.622  |
|   | Model summary                                    | R=0.557, R <sup>2</sup> =0.310, F=7.196, P=0.001 |       |       |        |        |        |
| Interference with mood                        | Constant   | 9.03   | 3.166 | 2.85  | 0.005  | 2.765  | 15.311 |
|   | Gender   | -1.16  | 0.503 | -2.31 | 0.022  | -2.160 | -0.167 |
|   | Duration of cancer                               | 0.01   | 0.009 | 2.05  | 0.042  | 0.001  | 0.038  |
|   | Presence of metastasis                           | -2.31  | 0.989 | -2.33 | 0.021  | -4.269 | -0.350 |
|   | The type of pain treatment                       | 1.00   | 0.348 | 2.90  | 0.004  | 0.320  | 1.698  |
| Model summary                                 | R=0.571, R <sup>2</sup> =0.326, F=7.724, P=0.001 |  |       |       |        |        |        |
| Interference with walking ability             | Constant   | 6.29   | 3.184 | 1.97  | 0.051  | -0.015 | 12.603 |
|   | Gender   | -1.32  | 0.506 | -2.62 | 0.010  | -2.329 | -0.325 |
|   | Presence of metastasis                           | -1.97  | 0.994 | -1.98 | 0.049  | -3.946 | -0.006 |
|   | Model summary                                    | R=0.533, R <sup>2</sup> =0.284, F=6.338, P=0.001 |       |       |        |        |        |
| Interference with normal walk                 | Constant   | 6.02   | 3.196 | 1.88  | 0.062  | -0.314 | 12.353 |
|   | Gender   | -1.34  | 0.508 | -2.64 | 0.009  | -2.348 | -0.336 |
|   | Model summary                                    | R=0.516, R <sup>2</sup> =0.267, F=5.816, P=0.001 |       |       |        |        |        |
| Interference with relations with other people | Constant   | 6.90   | 3.149 | 2.19  | 0.030  | 0.668  | 13.145 |
|   | Gender   | -1.21  | 0.500 | -2.42 | 0.017  | -2.204 | -0.222 |
|   | The type of pain treatment                       | 1.20   | 0.346 | 3.47  | 0.001  | 0.517  | 1.888  |
|   | Model summary                                    | R=0.567, R <sup>2</sup> =0.322, F=7.586, P=0.001 |       |       |        |        |        |
| Interference with sleep                       | Constant   | 10.45  | 3.309 | 3.15  | 0.002  | 3.898  | 17.012 |
|   | Presence of metastasis                           | -3.26  | 1.034 | -3.15 | 0.002  | -5.312 | -1.217 |
|   | Model summary                                    | R=0.499, R <sup>2</sup> =0.249, F=5.306, P=0.001 |       |       |        |        |        |

| Model                               | Unstandardized Coefficient |       |  |       | 95% CI |        |        |
|-------------------------------------|----------------------------|-------|--|-------|--------|--------|--------|
|                                     | B                          | SE    | t  | P     | Lower  | Upper  |        |
| Constant                            | 11.12                      | 3.453 | 3.22   | 0.002 | 4.282  | 17.964 |        |
| Interference with enjoyment of life | Gender                     | -1.18 | 0.548  | -2.15 | 0.033  | -2.267 | -0.094 |
|                                     | Presence of metastasis     | -3.12 | 1.078  | -2.89 | 0.005  | -5.261 | -0.988 |
| Model summary                       |                            |       | R=0.520, R <sup>2</sup> =0.271, F=5.943, P=0.001 |       |        |        |        |

Additionally, the gender (B=-1.16; 95% CI: -2.16, -0.16; P=0.002), presence of metastasis (B=-2.31; 95% CI: -4.26, -0.35; P=0.021) were negatively and duration of cancer (B=0.01; 95% CI: 0.01, 0.03; P=0.042) and the type of pain treatment (B=1.00; 95% CI: 0.32, 1.69; P=0.004) was positively associated with mood. Furthermore, gender (B=-1.32; 95% CI: -2.32, -0.32; P=0.010, B=-1.18; 95% CI: -2.26,-0.09; P=0.033, respectively) and presence of metastasis (B=-1.97; 95% CI: -3.94, -0.006; P=0.049, B=-3.12; 95% CI: -5.26, -0.98; P=0.005, respectively) were negatively related to walking ability and enjoyment of life. The gender (B=-1.34; 95% CI: -2.34,-0.33; P=0.009) were negatively associated with normal walk. The gender was negatively (B=-1.21; 95% CI: -2.20, -0.22; P=0.017), and the type of pain treatment was positively (B=1.20; 95% CI: 0.51, 1.88; P=0.001) associated with relations with other people. The presence of metastasis (B=-3.26; 95% CI: -5.31, -1.21; P=0.002) was negatively associated with sleep (Table 2).

The mean general pain severity was 1.78±1.72. In addition, the mean worst pain score in the last 24 hours

was 2.96±2.65; the mean least pain score in the last 24 hours was 0.88±1.40; the mean pain score in the last 24 hours was 1.90±1.79, and the mean current pain score was 1.52±1.74. The gender (B=-0.92, 95% CI: -1.48%, -0.36%, P=0.001) and presence of metastasis (B=-1.56, 95% CI: -2.66%, -0.46%, P=0.006) were negatively associated with pain intensity.

Among pain interference factors, sleep (3.86±3.06) and mood (3.43±3.09) scored higher than others. In addition, 78.8% of patients recovered from their pain with pain treatments or medications. Among the pain interference items, the gender was negatively (B=-1.28, 95% CI: -2.25%, -0.31%, P=0.010), and the type of pain treatment was positively (B=0.95; 95% CI: 0.28%, 1.62%; P=0.006) associated with general activities (Table 2).

The mean scores of organic and psychological beliefs were 2.86±0.62 and 3.71±0.83, respectively. Stage of cancer (B=0.22, 95% CI: 0.03%, 0.41%, P=0.018) and presence of metastasis (B=0.46, 95% CI: 0.03%, 0.89% P=0.034) were positively associated with organic pain

**Table 3.** Regression coefficients for demographic and clinical factors associated with pain beliefs in adults with cancer-related pain

| Model                     | Unstandardized Coefficient   |       |  |       | 95% CI |       |       |
|---------------------------|------------------------------|-------|--|-------|--------|-------|-------|
|                           | B                            | SE    | t  | P     | Lower  | Upper |       |
| Constant                  | 1.53                         | 0.697 | 2.19   | 0.030 | 0.149  | 2.912 |       |
| Organic pain belief       | Stage of cancer              | 0.22  | 0.094  | 2.40  | 0.018  | 0.039 | 0.411 |
|                           | Presence of metastasis       | 0.46  | 0.218  | 2.14  | 0.034  | 0.035 | 0.898 |
| Model summary             |                              |       | R=0.460, R <sup>2</sup> =0.211, F=4.285, P=0.001 |       |        |       |       |
| Constant                  | 1.38                         | 0.901 | 1.53   | 0.128 | -0.404 | 3.166 |       |
| Psychological pain belief | Gender                       | 0.32  | 0.143  | 2.27  | 0.025  | 0.042 | 0.609 |
|                           | The type of cancer treatment | 0.30  | 0.093  | 3.23  | 0.002  | 0.116 | 0.485 |
|                           | Presence of metastasis       | 0.62  | 0.281  | 2.20  | 0.029  | 0.063 | 1.178 |
| Model summary             |                              |       | R=0.495, R <sup>2</sup> =0.245, F=5.192, P=0.001 |       |        |       |       |



**Table 4.** Regression coefficients for demographic and caregiving factors associated with caregiver burden in caregivers of adults with cancer-related pain

| Model                            | Unstandardized Coefficient                       |        |       |       | 95% CI  |        |
|----------------------------------|--|--------|-------|-------|---------|--------|
|                                  | B  | SE     | t     | P     | Lower   | Upper  |
| Constant                         | 45.86  | 11.880 | 3.86  | 0.001 | 22.298  | 69.422 |
| Education status                 | -1.57  | 0.648  | -2.42 | 0.017 | -2.858  | -0.288 |
| Employment status                | -7.75  | 2.373  | -3.27 | 0.001 | -12.463 | -3.052 |
| Impact of other responsibilities | 2.75   | 1.175  | 2.34  | 0.021 | 0.421   | 5.080  |
| Model summary                    | R=0.609, R <sup>2</sup> =0.371, F=3.801, P=0.001 |        |       |       |         |        |

beliefs. Furthermore, gender (B=0.32, 95% CI; 0.04%, 0.60%, P=0.025), type of cancer treatment (B=0.30, 95% CI; 0.11%, 0.48%, P=0.002), and presence of metastasis (B=0.62, 95% CI; 0.06%, 1.17%, P=0.029) were factors positively associated with psychological pain beliefs (Table 3).

The mean caregiver burden score was 28.19±8.03, and caregivers experienced mild burden. Educational level (B=-1.57, 95% CI; -2.85%, -0.28%, P=0.017) and employment status (B=-7.75, 95% CI; -12.46%, -3.05%, P=0.001), the effect of caregiving on other responsi-

ties (B=2.75, 95% CI; 0.42%, 5.08%, P=0.021) were associated with caregiver burden (Table 4).

In addition, pain interference sub-dimensions such as relationships with other people (B=-1.57; 95% CI; -2.88, -0.26; P=0.019) were negatively associated with caregiver burden, while pain beliefs sub-dimension such as organic pain beliefs (B=-5.12; 95% CI; -9.00, -1.25; P=0.010) were positively associated (Table 5).

**Table 5.** Regression coefficients for pain severity, pain interference, and pain beliefs associated with caregiver burden in caregivers of adults with cancer-related pain

| Model             | Unstandardized Coefficient                       |        |       |        | 95% CI |        |        |
|-------------------|--|--------|-------|--------|--------|--------|--------|
|                   | B  | SE     | t     | P      | Lower  | Upper  |        |
| Constant          | 32.225   | 5.642  | 5.712 | 0.001  | 21.043 | 43.407 |        |
| Pain severity     | 1.316  | 0.663  | 1.985 | 0.050  | 0.002  | 2.631  |        |
| Pain interference | General activity                                 | -0.120 | 1.068 | -0.112 | 0.911  | -2.237 | 1.998  |
|                   | Mood   | 1.563  | 0.815 | 1.919  | 0.058  | -0.052 | 3.178  |
|                   | Walking ability                                  | -0.505 | 1.497 | -0.337 | 0.737  | -3.472 | 2.462  |
|                   | Normal walk                                      | 0.280  | 1.558 | 0.180  | 0.858  | -2.809 | 3.368  |
|                   | Relations with other people                      | -1.573 | 0.659 | -2.386 | 0.019  | -2.881 | -0.266 |
| Pain beliefs      | Sleep  | 0.386  | 0.566 | 0.681  | 0.498  | -0.737 | 1.508  |
|                   | Enjoyment of life                                | -0.017 | 0.698 | -0.025 | 0.980  | -1.402 | 1.367  |
|                   | Organic pain beliefs                             | -5.126 | 1.955 | -2.622 | 0.010  | -9.001 | -1.251 |
|                   | Psychological pain beliefs                       | 2.052  | 1.361 | 1.507  | 0.135  | -0.647 | 4.750  |
| Model summary     | R=0.516, R <sup>2</sup> =0.266, F=3.955, P=0.001 |        |       |        |        |        |        |

## Discussion

This study was conducted to provide evidence on pain characteristics, caregiver burden, and related factors. The results showed a significant relationship between gender and the presence of metastasis and pain intensity. In the literature, many studies have reported gender differences in pain severity that our results were similar to their results [33-35]. In addition, previous studies have shown that metastasis increases pain intensity [16, 36]. Therefore, it is recommended that healthcare professionals consider the effect of gender and the presence of metastasis when assessing pain intensity.

Our study showed that cancer-related pain negatively affected sleep and mood in patients with cancer. Ferreira et al. reported that cancer-related pain negatively affected mood, sleep, and normal walking in breast cancer survivors [37]. Chronic pain affects individuals in all aspects, including activities of daily living, physical and mental health, family, and social life [18]. Pain management guidelines suggest regular and systematic pain assessment is necessary for effective pain management [38]. Therefore, assessing all aspects of pain is very important.

This study revealed that patients' beliefs about pain were of psychological origin. This finding is similar to previous studies [39, 40]. Additionally, this study showed that the stage of cancer and the presence of metastasis are associated with organic pain beliefs, and gender, stage of cancer, type of cancer treatment, and the presence of metastasis were associated with psychological pain beliefs. Our study showed that the stage of cancer and the presence of metastasis were determinants of both organic and psychological pain beliefs. However, a lack of evidence on the relationship between these variables and pain beliefs suggests the need for further studies.

This study showed that gender was a predictor of psychological pain beliefs, and the mean score of psychological pain beliefs was higher in females. This finding was reported in similar studies [29, 39]. It is stated that psychological factors are more strongly associated with chronic pain in women, possibly because women experience more psychological distress than men, and women respond differently to emotional stimuli than men [41]. This study also reported that the type of cancer treatment was a predictor of psychological pain beliefs. However, no evidence exists of the relationship between these variables and pain beliefs. In the literature, it is reported that patients who undergo cancer treat-

ment experience more pain than patients who do not undergo treatment [42]. Healthcare professionals must assess patients' pain beliefs and plan pain management strategies according to their pain beliefs.

This study presented that the caregivers of patients with cancer-related pain experienced a mild caregiver burden. In a study conducted by Palacio et al. similar to our results, it was reported that caregiver burden was mild in patients with advanced cancer and cancer-related pain [43]. Apart from this study, there is a lack of evidence in the literature regarding caregiver burden in patients with cancer-related pain. However, it is reported in the literature that caregivers of the general cancer population experience mild to severe burden [15, 44, 45]. Our study showed that educational level, employment status, and the impact of caregiving on other responsibilities were predictors of caregiver burden. Previous studies in the general cancer population have shown that caregiver burden is associated with educational level, similar to our results [14, 45, 46]. Additionally, our study revealed that caregivers who were employed and caregiving interferes with other responsibilities had a high caregiver burden. Previous studies in the general cancer population have shown that caregiver burden is associated with employment status, similar to our results [25, 47]. A study by Danacı and Koç showed that the impact of caregiving on other responsibilities was associated with caregiver burden in the general cancer population [48]. Therefore, further studies are needed to investigate the relationship between these variables and caregiver burden. In addition, health professionals should assess all aspects of caregiver burden and support caregivers.

Our study revealed that relations with other people as a sub-dimension of pain interference were negative, and organic pain beliefs were positive predictors of caregiver burden in patients with cancer-related pain. This finding means that caregivers of patients who were more affected by pain interference with their relationships with other people experienced less caregiver burden. In addition, caregivers of patients who believe that pain is an organic source experience more caregiver burden. However, there is a lack of evidence on the relationship between pain interference in relations with other people, organic pain beliefs, and caregiver burden. Therefore, further studies are needed to investigate the relationship between pain interference, pain beliefs, and caregiver burden. In addition, health professionals should provide more support and help to caregivers of patients who experience more cancer-related pain [19].

Our study has several limitations. First, this single-center study included participants who met the inclusion and exclusion criteria for 8 months. Therefore, the sample size may not be sufficient to evaluate the effect of some variables. Second, pain is a subjective symptom influenced by psychosocial factors. In our study, we determined whether pain was of psychological or organic origin, but we did not evaluate the emotional state of the patients. It is recommended that the emotional dimension of pain be assessed in future studies. Third, we did not exclude patients receiving painkillers or analgesics, which may affect the reliability of our results.

## Ethical Considerations

### Compliance with ethical guidelines

This study was conducted in accordance with the Helsinki Declaration and received ethical approval from the Research Ethics Committee of the relevant institution (18140/11). Patients with cancer and their caregivers received written and verbal information about the study purpose, procedure, and participants' role before data collection. Patients with cancer and caregivers were informed that they had the autonomy to participate in or withdraw from the study at any time without any explanation or reason.

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### Authors' contributions

Conceptualization, study design, data analysis, manuscript editing, revision, and final approval: Şefika Tuğba Yangöz and Medet Korkmaz; Final approval: All authors.

### Conflict of interest

The authors declared no conflict of interest.

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