

Research Paper

Attitudes and appropriateness of pain management in cancer patients using pain management index

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Received April 23, 2020; Accepted October 13, 2020.

Abstract

Objectives Inadequate management of cancer pain (CP) remains a global medical problem. In this study, the aim was to assess attitudes of cancer patients towards their CP treatment and to evaluate effectiveness of pain management.

Methods A sample of 300 adult cancer patients admitted to a single hospital were face-to-face interviewed in a cross-sectional study design using a structured questionnaire. The short form of the Brief Pain Inventory was used to collect data on pain, and Pain Management Index (PMI) was calculated to assess adequacy of pain management.

Key findings Median age of patients was 53 years (interquartile range, 43–63). Half of patients (50.5%) believed their pain therapy needs improvement. Almost half patients had severe pain at interview (49.8%). Pain interfered most with patient enjoyment of life with a mean interference score 6.13 ± 2.37 . Majority of cancer patients (84.3%) received a non-opioid analgesic while a minority (15.7%) received opioid analgesic in which morphine was the most common drug. The use of non-opioid adjuvants was minimal. Mean PMI for patients was -1.15 ± 0.75 (range -2 to $+1$), and most patients (80.3%) had inadequate pain treatment. Gender and smoking status of patients were significantly associated with adequacy of pain management ($P = 0.009$ and $P = 0.004$, respectively). There were no associations between patient age, educational level or tumour characteristics and adequacy of pain management.

Conclusions Cancer patients in this study present with severe pain and the rates of undertreatment are high. There is an urgent need to improve management plans to assure appropriate use of therapeutic modalities for treatment of cancer-related pain.

Keywords: pain; cancer; pain measurement; opioids; attitudes

Introduction

Pain is a major symptom among cancer patients.^[1] Cancer patients suffer from pain frequently whether at diagnosis or treatment and more commonly with advanced stages of the disease.^[2] The

prevalence of cancer-related pain has ranged from 14% to 100% in surveys.^[3] A systematic review and meta-analysis of pain prevalence and severity in cancer patients revealed high rates of pain during anticancer treatment and among patients with advanced or

metastatic disease in which pain intensity was mostly moderate to severe.^[4]

The revised International Association for the Study of Pain (IASP) definition of pain (2020) states: 'An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage.'^[5] Cancer pain (CP), on the other hand, is not one homogenous type of pain.^[6] CP is classified as chronic cancer-related pain. Not all cancer-related pain arises from the tumour itself. Thus, the definition 'Chronic cancer-related pain is chronic pain caused by the primary cancer itself or metastases (chronic CP) or its treatment (chronic postcancer treatment pain)' allots to this.^[6] A standardized taxonomy for the classification of cancer-related pain is currently lacking. CP could be further classified into categories and coded for the benefits of the patient and the researcher.^[6] CP is multidimensional and hard to assess.^[7] The neurophysiology of CP is complex, and it can be classified as somatic or neuropathic in origin.^[8] CP could be the consequence of the disease itself or treatment related.^[9] Cancer treatments including surgery, chemotherapy and radiotherapy were found to cause pain even in cancer survivors.^[10] CP can produce debilitating and devastating symptoms which significantly affect patients' daily activities, physical functioning, emotional state and their quality of life.^[1, 11]

Currently, multiple guidelines are available for the management of CP. Among these are the World Health Organization (WHO) ladder for CP relief in adults,^[12] the Expert Working Group of the European Association for the Palliative Care guidelines,^[13] the European Society for Medical Oncology (ESMO) guidelines,^[14] the American Society of Clinical Oncology (ASCO) clinical practice guidelines,^[15] the European Association for Palliative Care (EAPC) guidelines^[16] and the National Comprehensive Cancer Network (NCCN) guidelines,^[17] which are applied by many institutions to manage CP. Opioids are cornerstone pharmacological therapies of CP management.^[18, 19] In addition, non-opioid adjuvants which are 'drugs with other indications but have analgesic effect in certain pain conditions' are commonly used in current clinical practice for treatment of CP.^[20] Despite the availability of multiple pain treatment modalities, accumulating evidence indicates that cancer patients are receiving sub-optimal pain management.^[7] Undertreatment of pain in cancer patients remains a remarkable health problem in both developed and developing countries.^[21] A systematic review indicated that one out of two cancer patients is undertreated for pain.^[22]

Few studies described CP and its management among Jordanian patients. Previous studies indicated that pain is a major symptom among cancer patients in Jordan and its prevalence is high.^[23, 24] Taking into consideration the increasing incidence of cancer disease among Jordanian population, and the high prevalence of pain among cancer patients, there is an urgent need to evaluate current patterns and trends in CP management in healthcare settings, taking into account patient attitudes regarding pain management. Therefore, the goals of this study were to assess patients' opinions and needs towards their pain management plans and to evaluate appropriateness of CP treatment.

Methods

Study design and settings

A cross-sectional study was conducted at the Inpatient Oncology and Hematology Units of Al Bashir Hospital located at Eastern Amman, Jordan. The hospital serves multiple directorates in Amman city, and it contains special Oncology and Hematology Units providing medical services to a large number of cancer patients.

Study population

The study enrolled adult cancer patients who were admitted to Oncology or Hematology Units during data collection. Diagnosis of carcinoma was further confirmed by reviewing pathology reports issued by Pathology Department. A signed informed consent was obtained from patients before their participation in the study. Sample size was determined using G power applying medium effect size and power of 0.8.

Study procedure

Convenience sampling was used to recruit cancer patients to this study. Eligible patients were approached by a trained graduate student (Y.A.) who explained the study and its goals. Upon patient approval to participate, the graduate student interviewed the patient in a face-to-face survey and filled the data collection form. Interviews took place at patients' rooms, chemotherapy unit waiting room or the radiotherapy waiting room. Average time for interviewing patients was 10–15 min.

Data collection form

A structured questionnaire was developed and modified by the investigators based on surveys published in previous studies.^[23, 25–27] The questionnaire was developed in English language and then translated from English to Arabic and back translated to English to assure the accuracy of the translation process. Face and content validity of the questionnaire were evaluated by Faculty members at Faculty of Pharmacy at Jordan University of Science and Technology (JUST). The questionnaire was then examined by an expert group of nine specialists including medical doctors, nurses and clinical pharmacists who were asked to fill the questionnaires and give their opinion and comments. Afterwards, a pilot study including a small group of patients (15 patients) were also asked to give feedback about the questionnaire. The pilot group resulted in minor changes to the study tool, and the final draft was used for data collection. Data from the pilot group were excluded from final analysis. The data collection form was composed of the following sections: (1) demographics and life-style factors, (2) cancer type and disease characteristics, (3) attitudes towards CP management and (4) description of current pain treatments.

Demographics included variables to describe the study population such as age of patient, gender, marital status, smoking status, reason for hospital admission and others. The second part of the questionnaire described cancer type and related tumour information including disease stage and treatment.

A typical five-level Likert scale (strongly disagree, disagree, neutral, agree and strongly agree) was used to assess patients' attitudes towards CP and its management. The last part of data collection form reports data regarding CP treatment, analgesic type, name and number of adjuvants used, adverse effects of pain medications and non-drug treatments of pain used by cancer patients. In this study, the internal consistency reliability coefficient (Cronbach's α) calculated for attitude items was 0.756.

Assessment of pain intensity using the Brief Pain Inventory

The Brief Pain Inventory (BPI) was used to assess pain prevalence and interference with daily activities.^[28] BPI form was reproduced with special permission from MD Anderson Cancer Center. BPI is translated and is psychometrically and linguistically validated in many languages around the world including Arabic language.^[28] The

BPI consists of 7 questions with 15 items and an 11-point Numeric Rating Scale of 0 (no pain) to 10 (worst pain imaginable), in which patients were asked to rate their mean pain over the last 24 h. Additionally, the BPI was used to ask for interference of pain with daily activities over the last 24 h and to indicate the site of pain at interview.

Assessment of pain management using Pain Management Index

To assess appropriateness of pain treatment, the Pain Management Index (PMI) was applied. PMI is a standardized measure that has been developed by Cleeland *et al.* which compares the most potent analgesic prescribed for a patient with the reported level of the worst pain of that patient in the past 24 h.^[25, 29] PMI values range from -3 (a patient with severe pain receiving no analgesic drugs) to +3 (a patient receiving morphine or an equivalent and reporting no pain). Negative PMI values indicate under treatment of CP where values of 0 or higher indicate acceptable treatment.^[25, 29]

PMI values were calculated by subtracting the pain score from the analgesic score. Pain score was determined according to patient's current pain (at the time of the interview) in the BPI as: 1-4, mild; 5-6, moderate and 7-10, severe pain. No pain was scored as 0; mild pain, 1; moderate pain, 2 and severe pain, 3. Analgesic score was determined according to WHO analgesic ladder classification as: 0, no analgesic drug; 1, a non-opioid [e.g. Non-steroidal anti-inflammatory drugs (NSAIDs)]; 2, a weak opioid (e.g. codeine or tramadol) and 3, a strong opioid (e.g. morphine, fentanyl, buprenorphine and oxycodone).^[25]

Statistics

Data analysis was performed using IBM SPSS statistical package (IBM Corp. Version 23.0. Armonk, NY, USA). Continuous variables are presented as means \pm standard deviation or the median and the interquartile range (IQR). Categorical variables are presented as frequency and percentages (n, %). Descriptive statistics were used to characterize the study sample. Associations between categorical variables were evaluated applying chi-square test of independence. All *P* values were two-sided and differences were considered statistically significant at *P* < 0.05.

Results

Data collection took place on July 2015 through September 2015. The study population included patients at varying stages of cancer disease. Interviewed patients were admitted to the hospital for at least 24 h.

Patient demographics

The median age of patients was 53 years (IQR, 43-63). Most patients were females (63.9%) and were married (89.3%). Most patients were admitted to hospital to administer chemotherapy (32.6%). Other demographic characteristics for patients are given in Table 1.

Tumour characteristics of patients

Table 2 represents tumour characteristics for patients. Most patients had a diagnosis of breast cancer (36.0%) followed by colorectal cancer (10.3%). More than half of patients presented with early stage of disease (62.5%) and had a diagnosis of cancer for less than 1 year (49.7%). Bone was the most common site for metastasis for patients presented with metastatic disease (Table 2). Vast majority of patients received chemotherapy (81.0%).

Table 1 Demographics of patients (*N* = 300)

Characteristics	<i>n</i> (%)
Age, years	
<30	14 (4.7)
30-75	272 (91)
>75	13 (4.3)
Gender	
Male	108 (36.1)
Female	191 (63.9)
Marital status	
Single	22 (7.4)
Married	267 (89.3)
Divorced	4 (1.3)
Widowed	6 (2.0)
Education	
None	55 (18.4)
Primary	60 (20.1)
High school	106 (35.5)
University graduate	76 (25.4)
Postgraduate	2 (0.7)
Smoking	
Current	69 (23.1)
Past	56 (18.7)
Never	174 (58.2)
Comorbidities	
None	203 (67.7)
Cardiovascular disease	71 (23.7)
Respiratory disease	3 (1.0)
Endocrine disease	46 (15.3)
Autoimmune disease	8 (2.7)
Others	13 (4.3)
Reason for hospital admission	
First visit	20 (6.7)
Chemotherapy	97 (32.6)
Radiotherapy	60 (20.1)
Follow-up	28 (9.4)
Complications	40 (13.4)
Pain problems	17 (5.7)
Others	36 (12.1)
Presence of family member	
Yes	256 (85.9)
No	42 (14.1)
Daily medications ^a	
0-2	222 (74.2)
3-4	41 (13.7)
5 or more	36 (12.0)

Other comorbidities included neurological disease and coagulable disease.

^aDaily medications reported are excluding drugs administered for management of pain.

Attitude towards CP management among patients

Attitude of cancer patients towards their current pain treatment plans is summarized in Table 3. Half the patients (*n* = 151, 50.5%) believed that their CP therapy needs improvement and agreed on the need to faster onset of relief of their CP. Most patients (*n* = 181, 60.6%) agreed to the statement 'I need better explanation of the adverse effects of the CP medications I am using'. Majority of patients (79.6%) agreed to involve a pharmacist in CP treatment plan. Most patients (*n* = 249, 83.3%) showed positive attitude towards receiving educational material about CP management. Other attitude statements are given in Table 3.

Pain among cancer patients

BPI has been used to assess pain among cancer patients interviewed in this study. Table 4 describes pain intensity according to the variable statements included in the BPI form.

Mean 'worst' and 'average' pain were 7.28 and 2.86, respectively (Table 4). Mean value for the pain patients expressed while conducting the interview 'right now' was 2.5 ± 2.7 (range 0–10).

Table 2 Tumour characteristics for cancer patients ($N = 300$)

Characteristics	<i>n</i> (%)
Type of cancer	
Breast	108 (36.0)
Colorectal	31 (10.3)
Gynaecologic	26 (8.7)
Lung	23 (7.7)
Prostate	16 (5.3)
Leukaemia	22 (7.3)
Lymphoma	19 (6.3)
Others	52 (17.3)
Stage of carcinoma	
Early (stage I/II)	162 (62.5)
Advanced (stage III/IV)	97 (37.5)
Metastatic site	
Bone	38 (12.7)
Liver	18 (6.0)
Brain	12 (4.0)
Lung	28 (8.7)
Others	13 (4.3)
Period with cancer, years	
<1	145 (49.7)
1–5	118 (40.4)
>5	29 (9.9)
Cancer therapy	
None	27 (9.0)
Chemotherapy	243 (81.0)
Radiation	165 (55.0)
Surgery	182 (60.7)

Other cancer types include multiple myeloma, liver, gastric, urinary bladder and brain cancers. Leukaemia included both acute and chronic types. Lymphoma included both Hodgkin's and non-Hodgkin's types.

Most patients had severe pain at interview 'right now' ($n = 149$, 49.8%), while moderate and mild pain were described by (44.5%) and (5.7%) of patients, respectively.

On average, (73.19%) of patients reported pain relief after taking pain medications. Pain interfered most with patient enjoyment of life, general activity, normal work and walking ability. However, pain interference was least with patient relation with other people (Table 4).

Abdomen was the most common site of pain reported by patients (35%), followed by lower extremities (28%), head and neck (26%) and chest (26%) (Figure 1).

Pain management of cancer patients

Majority of cancer patients (84.3%) received a non-opioid analgesic for pain management during their hospital stay (Table 5). Forty-seven patients (15.7%) received opioid analgesic and morphine was the most common drug. Opioid treatment was mainly scheduled (46.7%). Most patients received no adjuvant treatment ($n = 225$, 77.9%). However, dexamethasone was the main adjuvant for patients who had a non-opioid adjuvant treatment (Table 5).

All patients administering opioid analgesic received a laxative, 26 patients received antiemetic medication, and one patient administered antihistamine drug (Table 5).

Regarding non-pharmacological pain therapies, 128 patients (42.7%) reported using alternative therapies as part of their CP management. Herbal remedies were mostly used among alternative therapies ($n = 99$, 77.3%). Nevertheless, none of cancer patients in this study indicated the use of essential oils, massage, acupuncture, hot water bottles or meditation for pain relief.

Appropriateness of pain management among cancer patients

Adequacy of pain management was assessed based on PMI. Mean PMI for cancer patients in this study was -1.15 ± 0.75 (range -2 to $+1$). Most patients ($n = 240$, 80.3%) had inadequate pain treatment based on calculated PMI values.

Gender of patients was significantly associated with adequacy of pain management ($P = 0.009$), in which female patients had inadequate pain relief compared to male patients (32.5%) who also had

Table 3 Attitude of cancer patients towards their current pain treatment plans ($N = 300$)

Statement	<i>n</i> (%)				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
My CP therapy needs improvement	8 (2.7)	138 (46.2)	2 (0.7)	112 (37.5)	39 (13.0)
I need faster relief of my CP	8 (2.7)	140 (46.8)	0 (0.0)	112 (37.5)	39 (13.0)
I need more interaction with my medical doctor (MD) or registered nurse (RN) regarding CP treatment	11 (3.7)	206 (68.9)	0 (0.0)	65 (21.7)	17 (5.7)
I need better explanation of the adverse effects of the CP medications I am using	1 (0.3)	115 (38.5)	2 (0.7)	173 (57.9)	8 (2.7)
I need better management of adverse effects of the CP medications I am using	2 (0.7)	267 (89.3)	1 (0.3)	26 (8.7)	3 (1.0)
I would recommend that a pharmacist to be involved in my CP treatment plan	0 (0.0)	51 (17.1)	10 (3.3)	200 (66.9)	38 (12.7)
I never have proper CP relief even after taking my pain medicine	5 (1.7)	175 (58.5)	6 (2.0)	109 (36.5)	4 (1.3)
I frequently need to use non-prescription pain medicine in addition to my prescribed CP medications to control my pain	8 (2.7)	160 (53.5)	0 (0.0)	127 (42.5)	4 (1.3)
I adhere to my CP treatment	0 (0.0)	2 (0.7)	1 (0.3)	266 (89.0)	30 (10.0)
I appreciate getting educational programs/material about CP management if available	0 (0.0)	30 (10.0)	20 (6.7)	209 (69.9)	40 (13.4)

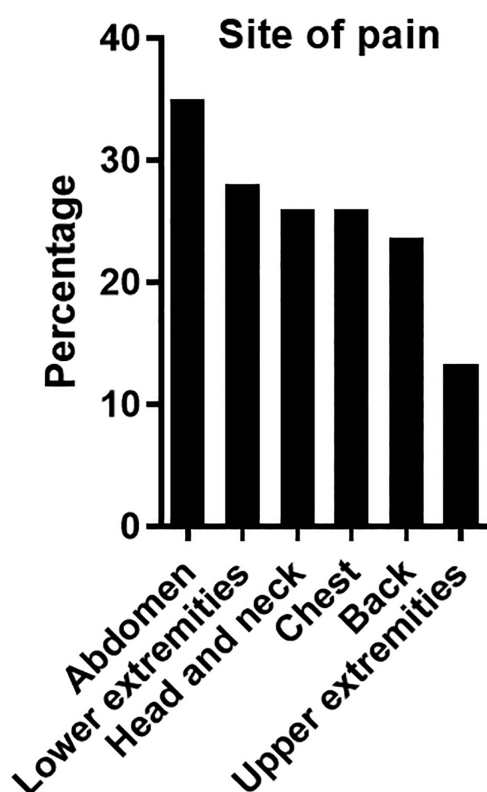
Table 4 Scores of pain intensity and interference with life activities according to BPI among cancer patients (*N* = 300)

Pain intensity item ^a	Mean \pm SD (range)
Worst pain patient had in the last 24 hours (<i>Worst</i>)	7.28 \pm 2.21 (2–10)
Least pain patient had in the last 24 hours (<i>Least</i>)	1.92 \pm 2.37 (0–10)
Average pain patient had (<i>Average</i>)	2.86 \pm 2.38 (0–10)
Pain patient has right now (<i>Right now</i>)	2.50 \pm 2.67 (0–10)
Percentage of pain relief after taking pain medications ^b	73.19 \pm 26.76 (10–100)
Pain interference item ^c	Mean \pm SD (range)
Pain interference with patient general activity	5.79 \pm 2.39 (0–10)
Pain interference with patient mood	4.35 \pm 2.87 (0–10)
Pain interference with patient walking ability	5.25 \pm 3.50 (0–10)
Pain interference with patient normal work	5.71 \pm 3.06 (0–10)
Pain interference with patient relations with other people	1.39 \pm 2.53 (0–10)
Pain interference with patient sleep	4.17 \pm 3.54 (0–10)
Pain interference with patient enjoyment of life	6.13 \pm 2.37 (0–10)

^aPain intensity scale; 0: no pain, 10: pain as bad as you can imagine.

^bPercentage of pain relief; 0%: no relief, 100%: complete relief.

^cPain interference scale; 0: does not interfere, 10: completely interferes.

**Figure 1** Site of pain in cancer patients.

sub-optimal pain management. In addition, adequacy of pain treatment was significantly associated with smoking status ($P = 0.004$, Table 6). None of the tumour characteristics examined in association analysis were found to be significantly associated with pain

Table 5 Pain management of cancer patients (*N* = 300)

Item	<i>n</i> (%)
Analgesics	
Non-opioid	252 (84.3)
Opioid	31 (10.3)
Combination of opioid and non-opioid	15 (5.0)
Combination of strong opioid and weak opioid	1 (0.3)
Opioid analgesic ^a	
Morphine	40 (85.1)
Tramadol	7 (14.9)
Opioid administration ^a	
Around the clock	21 (46.7)
As needed	15 (33.3)
Both	9 (20.0)
Non-opioid adjuvants	
None	225 (77.9)
Dexamethasone	61 (21.1)
Pregabalin	1 (0.3)
Management of opioid adverse effects ^a	
Laxatives	47 (100)
Antiemetics	26 (55.3)
Antihistamines	1 (2.1)

^a47 patients received opioid analgesics.

management. However, a greater proportion of patients with haematologic malignancies were found to have inadequate pain control compared to patients diagnosed with solid cancers (Table 6).

Discussion

The incidence of cancer in Jordan is rising and its treatment is costly.^[30] With the variety of causes and factors affecting CP, optimal management became more challenging.^[31] The WHO three-step ladder serves as an algorithm for a sequential pharmacological approach to treatment according to the intensity of pain reported by cancer patients.^[12] The first step of the ladder suggests a non-opioid (acetaminophen or an NSAID) for mild pain. If the pain is not responsive or increases in severity, the guidelines recommend a weak opioid (codeine, dihydrocodeine or tramadol). The third step of the ladder suggests using a strong opioid such as morphine, fentanyl and oxycodone for severe pain or pain inadequately controlled by weak opioid. In addition, WHO guidelines recommend non-opioid adjuvants to be added at all steps of the ladder based on pain intensity and clinical context.^[12,20]

Despite the available treatments and the WHO guidelines for pain management, CP remains largely undertreated worldwide.^[32] Results from our study indicated that most patients had severe pain at time of interview as well as severe pain in its worst intensity while described average pain as mild. In a study by Boveldt *et al.*, worst pain intensity among cancer patients in outpatient settings was moderate to severe.^[32] Regularly, pain may be accompanied by changes in personality, lifestyle and functional abilities.^[1] Results from this study indicated that pain potentially interfered with several aspects of the daily activities of patients including mood, sleep, normal work, walking ability and enjoyment of life. These findings are consistent with other studies assessing the impact of pain on quality of life for cancer patients.^[33–35] Although most patients reported some degree of pain relief after treatment, PMI indicated that majority of cancer patients (80.3%) in this study were inadequately treated. Earlier reviews on pain management demonstrated that the range of negative PMI varied from 8% to 82% in cancer patients.^[22] These findings are in agreement with those

Table 6 Association of demographic and tumour variables with adequacy of pain management in cancer patients (*N* = 300)

Variable	Pain management based on PMI ^a		<i>P</i> value
	Adequate (<i>n</i> = 59)	Inadequate (<i>n</i> = 240)	
Age, years			0.464
<30	1 (1.7)	13 (5.4)	
30–75	55 (93.2)	217 (90.4)	
>75	3 (5.1)	10 (4.2)	
Gender			0.009*
Male	30 (50.8)	78 (32.5)	
Female	29 (49.2)	162 (67.5)	
Education			0.056
None	9 (15.3)	46 (19.2)	
Primary	6 (10.2)	54 (22.5)	
High school	21 (35.6)	85 (35.4)	
University graduate	22 (37.3)	54 (22.5)	
Postgraduate	1 (1.7)	1 (0.4)	
Smoking status			0.004*
Current	19 (32.2)	50 (20.8)	
Past	17 (28.8)	39 (16.3)	
Never	23 (39.0)	151 (62.9)	
Comorbidities			0.064
Yes	13 (13.5)	83 (86.5)	
No	46 (22.7)	157 (77.3)	
Presence of family member			0.775
Yes	50 (84.7)	206 (86.2)	
No	9 (15.3)	33 (13.8)	
Daily medications ^b			0.535
0–2	47 (21.2)	175 (78.8)	
3–4	7 (17.1)	34 (82.9)	
5 or more	5 (13.9)	31 (86.1)	
Type of cancer			0.065
Breast	17 (15.7)	91 (84.3)	
Colorectal	10 (32.3)	21 (67.7)	
Gynaecologic	4 (15.4)	22 (84.6)	
Lung	8 (34.8)	15 (65.2)	
Prostate	5 (31.3)	11 (68.8)	
Leukaemia	1 (4.8)	20 (95.2)	
Lymphoma	2 (10.5)	17 (89.5)	
Others	10 (19.2)	42 (80.8)	
Stage of disease			0.167
Early	30 (54.5)	132 (64.7)	
Advanced	25 (45.5)	72 (35.3)	
Period with cancer, years			0.427
<1	25 (42.4)	120 (51.5)	
1–5	28 (47.5)	90 (38.6)	
>5	6 (10.2)	23 (9.9)	
Metastasis			0.08
Yes	22 (40.7)	59 (28.4)	
No	32 (59.3)	149 (71.6)	

^aPMI: Inadequate: < 0, adequate ≥ 0^bDaily medications reported are excluding drugs administered for management of pain.Data are presented as *n* (%). *Statistical significance at *P* < 0.05.

previously demonstrated by Al Qadiri *et al.* who reported inadequate pain treatment among a group of Jordanian cancer patients with a mean negative PMI.^[23] Several other studies consistently reported sub-optimal relief of pain in cancer patients in both outpatient and inpatient settings.^[36–38] A systematic review by Greco *et al.* using PMI to assess the adequacy of pain management in cancer patients revealed improvement in the quality of pharmacologic pain management.^[21] However, approximately one third of cancer patients are not receiving pain medication proportional to their pain intensity.^[21]

Undertreatment of CP has been recognized to be caused by multiple factors which can be related to patients, healthcare professionals or healthcare systems. Patients are usually concerned about opioid side effects and the addictive risk of these drugs.^[39, 40] Earlier studies showed that some healthcare professionals lack sufficient knowledge of the principles of pain relief, adverse effects of management or understanding of key concepts such as addiction, tolerance and dosing, thus leading to inadequacy in pain management.^[41–45] Together, these factors limit the rational use of opioids resulting in lack of adequate pain relief and management.

With the consideration that experience of pain is highly subjective and can vary substantially from one individual to the other,^[46] patients are cornerstone partners in pain management plans. Thus, understanding patients' attitudes towards their CP and therapy is critical to optimize therapeutic goals. Cancer patients in this study described their interest in improving their pain management in terms of faster onset for pain relief and better explanation for adverse effects of pain therapies. Though most patients were satisfied with the level of interaction with their physicians and nurses, they also showed interest in having pharmacists among a multidisciplinary team for their pain management. Lou *et al.* showed that cancer patients have negative attitudes towards their CP management.^[47] As we found that most patients appreciate getting educational material about CP management, this could highly improve the awareness of patients regarding CP management leading to improved treatment of CP among Jordanian patients.

Opioids are gold standard drugs for the treatment of moderate-to-severe pain.^[18] Appropriate selection of opioid and non-opioid therapies can highly influence patient response and outcomes of CP management. Results from this study revealed that a minority of patients received opioids as their pain therapy. Morphine remains the opioid of first choice in treating moderate-to-severe CP.^[48] Most cancer patients received morphine, and few received tramadol in this analysis. In addition, findings demonstrated that utilization of adjuvants was minimal, and a small proportion of cancer patients received these drugs. Several adjuvant analgesics can be used alongside with opioids including corticosteroids, antidepressants and anticonvulsants.^[20] A recent systematic review and meta-analysis indicated that the use of non-opioid adjuvants significantly reduced pain as well as the consumption of opioids along with their adverse effects.^[49] Considering these findings, inadequate pain management could be attributed, at least in part, to underuse of opioids and inappropriate administration of adjuvants in this group of cancer patients. Constipation, nausea and vomiting, sedation and confusion are common adverse effects to opioids.^[50] These effects can be managed by adjusting the daily dose of the opioid or by adding suitable medications.^[50] All patients in this study received laxatives to manage opioid-induced constipation, and antiemetics were also administered to control nausea and vomiting resulting from opioid therapy.

Non-pharmacological therapies can be used alone or combined with drugs for the treatment of pain. Examples of these therapies include acupuncture, acupressure, relaxation, meditation, hypnosis, therapeutic massage, transcutaneous electrical nerve stimulation (TENS), musical therapy and cold-hot treatments.^[51] Herbal medicine has been also used to treat different kinds of pain including lumbago and back pains.^[52] In this study, use of non-drug modalities to manage CP was reported by less than half of patients and the use of herbal remedies was the most common approach.

Findings from this study showed that patient gender and smoking status were significantly associated with pain management. No significant associations were found regarding age of patients, educational status, comorbidities and tumour characteristics. In line with this, female patients were found to have less optimal treatment than male patients.^[53] In the same context, Yordanov *et al.* found that increasing patient age, unemployment and lower educational level to be associated with negative PMI among a population of Bulgarian cancer patients.^[54] It is likely that undertreatment of CP is more troublesome for elderly patients, women, the unemployed and the less educated.

This study has some limitations. Although PMI is a widely utilized tool to assess adequacy of CP management, the use of PMI is limited by its potential to assess a single aspect of pain management attributed to the interplay between intensity of pain and the analgesic therapy used.^[55] In this context, other aspects of pain management such as dosage of analgesics used and response to breakthrough pain are not counted by PMI assessment.^[55] In addition, the study was conducted at a single hospital which may limit the generalizability of its findings. Increasing the sample size could have the impact of revealing some associations which failed to reach the level of statistical significance. The main strengths of our study included its homogenous patient population and its diagnostic data that were generated by practitioners and protocols applied in a single medical institution.

Conclusions

Pain continues to be one of the most burdensome symptoms in cancer patients. The rate of undertreatment of CP in this study is alarmingly high and is comparable to past reports among Jordanian patients. Most patients presented with severe pain intensity and indicated the unpleasant impact of pain on several life-style aspects and activities. To the best of our knowledge, this is the first study to assess attitudes of Jordanian cancer patients towards their pain management plans. Clearly, patients are looking for greater relief of pain and increasing their knowledge in this regard. Collectively, these findings highlight the need for better pain management in cancer patients which requires knowledge of treatment guidelines and the best utilization of available therapeutic options, including both pharmacologic and non-pharmacologic modalities.

Funding

This work was supported by the Deanship of Research at the Jordan University of Science and Technology (JUST) [grant number 20150168].

Author Contributions

N.M.A. designed the study, performed data analysis, interpretation of results, and manuscript writing. K.Q.N. contributed to study design and conception and drafting of the manuscript. Y.A.A.-S. did data collection and entry. A.A.-Z. contributed to data collection and revision of the manuscript. All authors read and approved the final manuscript.

Conflict of Interest

Authors declare no conflicts of interest to disclose.

Ethical Statement

The study was approved by Institutional Review Board (IRB) committees of Jordan University of Science and Technology (JUST) and Ministry of Health (approval number 121/2015).

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