Original Article

Examining Pain and Performance Status of Radiotherapy Cancer Patients with Bone Metastasis

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Abstract

Aims: Bone metastases are detected in one-half of metastatic cancer patients. Pain, the major symptom in patients with bone metastasis, begins suddenly, is not relieved by resting, and worsens rapidly. The purpose of this study was to assess pain and performance status of radiotherapy cancer patients with bone metastasis.
Methods: This descriptive study was conducted in the radiation oncology service of a hospital between 30 November 2015 and 20 January 2016. Study data were collected using the Introductory Identification Questionnaire with a face-to-face interview method. For pain and performance assessment, The Visual Analog Scale (VAS) and Eastern Cooperative Oncology Group Performance Score (ECOG PS) forms were administered before radiotherapy (Time 1), at the middle of radiotherapy (Time 2), and after radiotherapy (Time 3). For the statistical significance level, $p<0.05$ was set.
Results: The difference between age, gender, RT dose, duration of RT and duration of disease, and the VAS and ECOG scores of participating patients was statistically insignificant($p>0.05$). The difference between the mean scores of patients on the VAS and ECOG during RT was statistically significant ($p<0.05$).
Conclusions: Analysis of study results determined that there was an inverse relationship between the pain and performance status of patients: as their pain was reduced, their performance status improved.

Keywords: Pain, cancer, bone metastasis, performance, radiotherapy

Introduction

Cancer requires long-term treatment; thus, the importance of this disease has increased worldwide and in Turkey in terms of both disease and economic burden. Along with chemotherapy and surgical therapy, radiotherapy is also frequently used in cancer treatment. Radiotherapy is preferred for curative purposes in many cancer treatments and for palliative purposes to relieve of cancer-related symptoms (Celik, 2014; Tezcan and KoC, 2012).

Two-thirds of individuals diagnosed with cancer experience a metastasis (Dogan, 2007). Following lung and liver metastases, as localization, bone metastasis (BM) is in the third place. Metastasis is especially prevalent in bone cancers, breast and prostate cancers, and in thyroid, lung, kidney, colon and gastric cancers: these constitute 80% of metastases (Mayadaglı et al., 2011; Hasbek et al., 2013).

It has been reported that one-third of patients with bone metastasis experience chronic pain in later stages of the disease. The purpose of bone metastasis treatment is to enhance patients' quality of life through ensuring their movement and functions by measures that prevent pain, development of pathological fractures, and spinal cord compressions (Cetin and Büyükberber, 2012). Palliative radiotherapy (RT) is an effective treatment for pain palliation. It is an optimal treatment option: it provided pain palliation in 80% to 90% of radiotherapy patients and rapidly reduced need for analgesics. The analgesic effect starts 48hours after the beginning of treatment and reaches a maximum after 4 weeks. The treatment algorithm for bone metastasis recommends RT administration in cases with no fracture risk and after stabilization or surgical intervention in pathological fracture cases. Before treatment, performance status, morbidity, and survival expectation of the patient should be assessed (Cetin and Büyükberber, 2012; Ozsaran, 2006).

For both patients and their families, a cancer diagnosis results indifficulties in terms of acceptance and compliance to treatment. Progression of disease or problems caused by local and systemic effects of treatment have an effect on morbidity, self-care adequacy, compliance to treatment, and quality of life (Kurt and Cetinkaya, 2006). It is important that nurses, who have a key role in patient care, cooperate both in multidisciplinary and interdisciplinary processes. Moreover, in terms of survival of patients and their quality of life, it is required that nurses, who also perform liaison functions, should understand the problems that RT patients experience at an early stage (Larsson[a] et al, 2007; Larsson[b] et al, 2007).

Some cancer patients do not want, or have to give up, treatment because they cannot tolerate the problems they experience during RT process. Quality healthcare service is provided when nurses predict these problems and do continuous follow-up and assessment, continue patients' treatment without a break, and prevent side effects of RT, (Yavas et al, 1999). Side effects of RT develop within the first 7-14 days; therefore, a careful follow-up by nurses during this period gains importance (Karadeniz, 2000).

Educating patients undergoing radiotherapy and counseling them are among nurses' responsibilities. They should learn what patients and their families expect, should make them feel that they have chance to ask questions, and should answer their questions. This increases patients' satisfaction and ensures that they feel better about themselves. A radiotherapy nurse should also assess the patient's pain level using pain measurement scales, should record which analgesics the patient uses and whether these drugs are effective. Side effects related to analgesics should be assessed, other drugs used by patients should be recorded, and possible drug interactions should be evaluated.

The purpose of this study was to assess the pain and performance status of radiotherapy cancer patients with bone metastasis.

Hypotheses of study

H_0= There is no significant relationship between pain and performance status of patients receiving radiotherapy and age, gender, radiation and disease duration.

H_1= There is a significant relationship between pain and performance status of patients receiving radiotherapy and age, sex, radiation and disease duration.

Methodology

Study Type

This is a descriptive study that was conducted in the radiation oncology service of a hospital between 30 November 2015 and 20 January 2016.

Study Population

The study population consisted of 156 patients who applied to the radiation oncology service between 30 November 2015 and 20 July 2016.The researchers performed a power analysis to calculate the sample size;it was calculated to be 75 patients (α (two-way) = 0.05; $\beta = 1 - 0.80 = 0.20$ ($\beta = 1 -$ power). The study sample included 75 volunteer patients who were aged 18 or older, were diagnosed with cancer, suffered from bone metastasis as well as their primary disease, who were suggested to receive the RT protocol, and met study inclusion criteria.

Study Ethics

This study was initiated after the ethics committee consent (protocol dated 03.08.2016 and numbered 137-3) was received; permission

for conducting the study in the institution (dated 01.08.2016 and numbered 85163007/799) was obtained from local ethical committee and the Union of Public Hospitals, respectively. The researchers obtained a written consent from volunteer patients who met study inclusion criteria.

Study Protocol

Study data, patients' introductory characteristics, and information regarding duration of disease were collected by face-to-face interview. The researchers carried out a pain and performance assessments three times: T_1, before RT (first day of RT);T_2,at the middle of RT protocol (for example, if the planned RT duration is 10days, at the fifth day of RT), and T_3, the last day of the RT protocol. Study data were collected in the educator nurse room by the two researchers (Figure 1).

Data Collection Tools

Introductory Information Form: This form included participants' socio-demographic information such as age, gender, educational background, employment status, income level, and marital status.Moreover, this form comprises information about the disease and treatment, including diagnosis, stage and duration of disease, other metastases and treatment mode, duration of RT administration, RT dose, and RT area.

Visual Analog Scale (VAS): To measure the pain level, this study used the VAS, which is considered to be the most frequently used, simple, easy-to-use, and a quick evaluation. This form asks patients to score their pain between 0 and 10: 0 indicates "no pain",whereas 10 indicates "intolerable pain" (Tulunay and Tulunay,2000).

Eastern Cooperative Oncology Group (ECOG): This scale is used to assess the performance status andgeneral well-being of cancer patients.Performance is scored between 0 and 5: 0 indicates "perfect health status", and 5 indicates "death" (Oken et al, 1982).

Statistical Analysis

Study data were analyzed using the statistical package program SPSS 20 for Windows(SPSS, Inc. Illinois, USA). Numbers (n), percentages (%) and means (X), standard deviation (SD), medians, minimum (min) and maximum (max) values were calculated to assess data. P-values smaller than 0.05 were acceptedas statistically significant. This study used the dependent- and paired-samples *t*-test for comparisons of T_1 and T_3. T-test and one-way variance analyses (one-way ANOVA) were performed in dependent groups where two variables were compared and for comparisons of three or more groups, respectively. This study used the Pearson correlation test to examine the relationship between two continuous variables. Statistical significance was set at $p<0.05$.

Results

The mean age of participants was 60.0±11.5 years, 66.7% were male, and 80% were primary school graduates. Of the participants, 64% were retired, 98.7% had social insurance, and 96% had a moderate income level. This study found that 92% of participants did not have regularly check-ups in the period before disease. All patients (100%) in the disease and treatment process reported their nutritional status as moderate (Table 1).

The mean duration of disease in patients to be 18.8±24.4 months (min:1;max: 120), and their mean RT duration was 13.9±7.3 (min–max: 5-46) days.All patients (100%) had stage 4 disease, and 21.3% suffered from other organ metastasis in addition to bone metastasis. Of the patients with other organ metastases 50% had brain metastasis, 31.2% had lung metastasis, and 18.8% had liver metastasis. This study determined that 33.3% of patients simultaneously received chemotherapy and RT; 29.3% received RT after chemotherapy;and 37.3% received RT after a surgical treatment. When a decision for the treatment was made, 52% of the patients used NSAIDs, and 42.7% used opioid drugs as analgesics, whereas 5.3% of the patients did not take an analgesic (Table 2).

Pain levels of participants were assessed during RT (at T_1, T_2,andT_3). Most of the patients (85%) suffered pain at a severe level inT_1, whereas 45.3% and 72% experienced mild levels of pain in periods T_2 and T_3, respectively (Table 3)

Performance status assessment of the participating patients during RT (T_1, T_2, T_3) showed that in T_1, 40% of the patients had 2

points on ECOG, whereas the score in both T_2 (49.3%)andT_3 (66.7%) was 1 (Table 4).

This study found that pre-RT pain and ECOG scores of patients decreased after RT, and that these differences were statistically significant **(p= 0.001)**(Table 5).

A positive relationship was found between the participating patients' age and their T_1 and T_2 VAS scores, whereas there was a slightly negative, statistically insignificant relationship between age and the T_3 VAS score (p>0.05). This study found a positive relationship between the patients' disease durations and their T_1 and T_2 VAS scores, and a slightly negative, and statistically insignificant relationship between disease duration and T_3 VAS score (p>0.05). Based on participants' characteristics regarding treatment, there was a positive, but statistically insignificant relationship between RT duration and $T_1$and T_2 VAS scores, whereas there was a positive and statistically significant relationship between RT duration and the T_3 VAS score **(p=0.035)** (Table 6).

Table 1. Sociodemographic Characteristics of Patients

Sociodemographic information	**X**	**SD**
Age		
Min-max: 34-85 age	60.0	11.5
	n	**%**
Gender		
Women	25	33.3
Man	**50**	**66.7**
Educational Status		
Primary Scool	**60**	**80.0**
High School ,	11	14.7
License	4	5.3
Working status		
Working	2	2.7
Retired	**48**	**64.0**
Can not work	1	1.3
Housewife	24	32.0
Health Assurance		
Yes	**74**	**98.7**
No	1	1.3
Economic Status		
Good	-	-
Middle	**72**	**96**
Bad	3	4
Regular Health Check		
Yes	6	8
No	**69**	**92**
Nutrition Status		
Good	-	-
Middle	**75**	**100**
Bad	-	-

Min-max: Minimum, maximum, SD: Standard deviation,

Table 2. Disease-Related Features of Patients

	X	SD
Disease Duration (min-max: 1-120 months)	18.8	24.4
RT Time (Min-max: 5-46 days)	13.9	7.3

	n	%
Diagnosis of disease		
Breast cancer	16	21.3
Lung cancer	**25**	**33.3**
GIS cancers	7	9.3
Prostate cancer	12	16.0
Urinary system cancer	7	9.3
Other cancers	4	5.3
Primer unknowns	4	5.3
Metastasis status * (except for bone metastasis)		
There is	16	21.3
No	**59**	**78.7**
The organ that metastasizes outside the bone		
Brain	**8**	**50**
Liver	3	18.8
Lungs	5	31,2
Therapy**		
Chemotherapy	47	62.6
Radiotherapy	75	100
Surgical	30	40
CT + RT	**25**	**33.3**
Perception of Disease		
An untreatable disease	2	2.7
A disease that requires long-term treatment	**73**	**97.3**
Analgesics used (T1)		
NSAIDs	**39**	**52**
Opioids	32	47.7
Can not use	4	5.3

Min-max: Minimum, maximum, SD: Standard deviation,
GİS: Gastrointestinal sistem, NSAİİ: Nonsteroidantiinflamatuar,
* (Apart from bone metastases) ** More than one option marked

Table 3. Distribution of Pain Levels During Participants' RT (T1, T2, T3)

Level of pain (VAS Score)	**T_1**		**T_2**		**T_3**	
	N	**%**	**N**	**%**	**n**	**%**
0 No	-	-	2	2.7	5	6.7
1-3 Light	1	1.3	15	20	**54**	**72**
4-6 Middle	10	13.3	**34**	**45.3**	13	17.3
7-10 and over severe *	**64**	**85.3**	24	32	**3**	**4**
X±SD (Min:0 Max: 10)	**10.0±2.2** (Min:0 Max: 10)		**6±2.3** (Min:0 Max: 10)		**2±1.7** (Min:0 Max: 8)	

***During the (T3), the VAS score was measured as 7-8 (9 and no pain level reported).**

Table 4. Distributions of Participants' Performance Levels During RT (T1, T2, T3)

Performance Level (ECOG Score)	**T_1**		**T_2**		**T_3**	
	N	**%**	**N**	**%**	**n**	**%**
0 (Asymptomatic)	1	1.3	3	4	10	13.3
1(Symptomatic but completely standing)	25	33.3	**37**	**49.3**	**50**	**66.7**
2 (Symptomatic less than 50% of the bed)	**30**	**40**	25	33.3	9	12
3 (Symptomatic 50% more in bed)	18	24	10	13.3	6	8
4 (Bedridden)	1	1.3	-	-	-	-
5 (Death)*	-	-	-	-	-	-
X±SD (Min:0 Max: 5)	**2±0.8** (Min:0 Max: 4)		1**±0.7** (Min:0 Max: 3)		**1±0.7** (Min:0 Max: 3)	

*Patients at 5 (Death) were not included in the study because they could not complete the RT.

Table 5. Comparisons of Pain and Performance Levels of the Participants in the RT Process (T1, T2, T3) (n = 75)

RT Process (T_1, T_2, T_3)		VAS X±SD	ECOG X±SD*	P**
T_1- T_2	T_1	8.8±2.2	1.9±0.8	**<0.001**
	T_2	5.4±2.3	1.5±0.7	
T_1 -T_3	T_1	8.8±2.2	1.9±0.8	**<0.001**
	T_3	2.4±1.7	1.1±0.7	
T_2 - T_3	T_2	5.4±2.3	1.5±0.7	**<0.001**
	T_3	2.4±1.7	1.1±0.7	

SD: Standard deviation, ** p<0.005

Table 6. Relevance of Some Descriptive Knowledge and Treatment Related Characteristics of Patients to Pain Levels and Performance Status (n = 75)

	T_1		**T_2**		**T_3**	
VARIABLES	**VAS**	**ECOG**	**VAS**	**ECOG**	**VAS**	**ECOG**
Age	p*= 0.301 r**= 0.121	p= 0.320 r= -.116	p=0.632 r= 0.56	p=0.334 r= -.113	p= 0.536 r= -.073	p=0.689 r= -.047
Disease Duration	p=0.817 r= 0.27	p= 0.105 r= -.188	p= 0.756 r= .36	p= 0.854 r= .022	p= 0.090 r= -.197	p= 0.541 r= -.072
RT Time	p= 0.725 r= 0.41	p= 0.125 r= .179	**p=0.077 r= .205**	**p= 0.023 r= ,262**	**p= 0.035 r= .243**	**p= 0.018 r= .272**
RT Dose	p= 0.231 r= -.140	p= 0. 886 r= -.017	p=0.907 r= -.014	p=0.,664 r= ,051	p= 0.810 r= .028	p= 0.350 r= .109

*p<0.05, **Pearson Correlation test

Table 7. Patients' Gender Relations with Pain Levels and Performance Status (n = 75)

	(T_1) X±SD*		(T_2) X±SD*		(T_3) X±SD*	
GENDER	**VAS**	**ECOG**	**VAS**	**ECOG**	**VAS**	**ECOG**
Woman (n=25)	8.44±2.36	2.0± .86	5.04±2.44	1.64±.86	2.12±1.78	1.24±1.01
Man (n=50)	8.98±2.12	1.86± .80	5.68±2.29	1.52± .73	2.56±1.66	1.10± .58
P**	0,321	0,492	0,269	0,531	0,296	0,526

** p<0.005

Table 8. Relation of Pain Levels and Performance Status of Analgesic Derivatives Used by Patients (n = 75)

	(T_1) X±SD*		(T_2) X±SD*		(T_3) X±SD*	
Analgesic Derivatives	**VAS**	**ECOG**	**VAS**	**ECOG**	**VAS**	**ECOG**
NSAİİ (n=39)	8,74±2,35	1.79± .80	5.25±2.23	1.48± .72	2.07±1.47	.97± .58
Opioid (n=32)	9,06±1,77	2.12± .83	5.96±2.44	1.71± .85	**3.03±1.82**	**1.43± .84**
Not used (n=4)	7,25±3,59	1.25± .50	3.50±1.73	1.0± .00	.75± .95	.50± .57
Total X±SD	8,80±2.20	1.90± .82	5.46±2.35	1.56± .77	2.41±1.70	1.14± .74
P**	0,297	0,062	0,101	0,152	**0,007**	**0.006**

** p<0.005

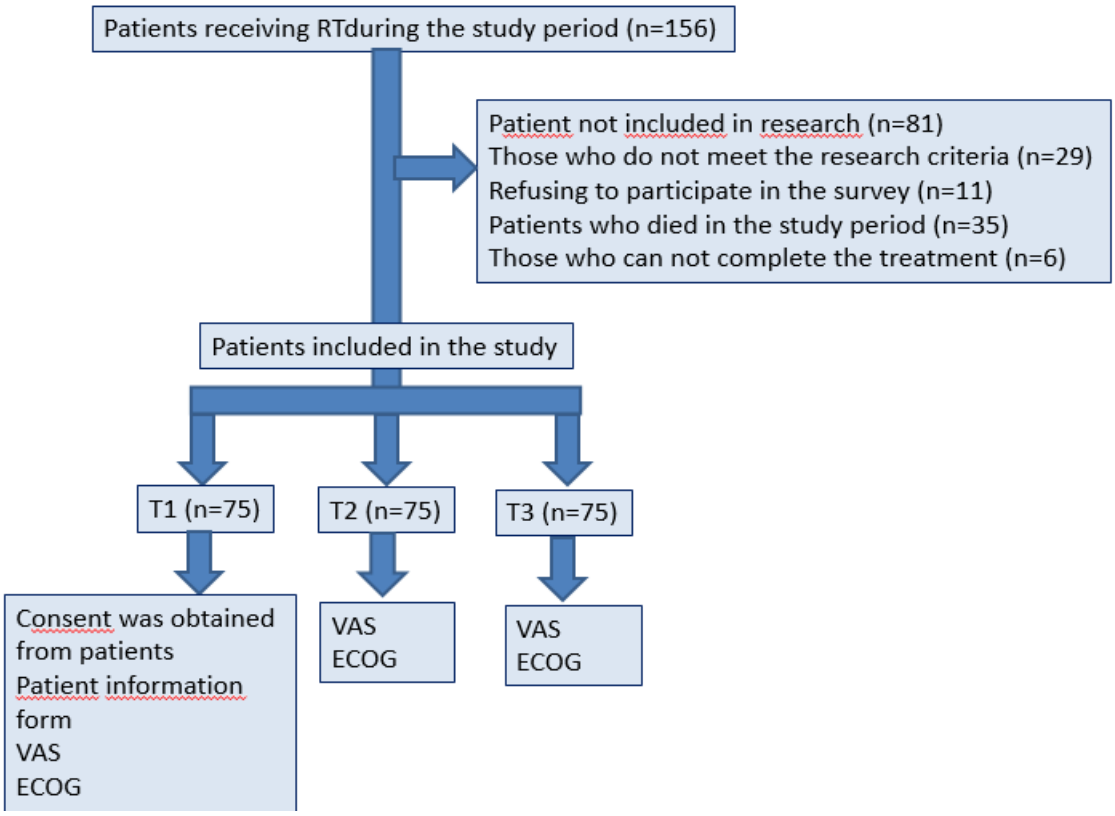

Figure 1. Working diagram

This study determined a slightly negative, statistically insignificant relationship between participants' age and ECOG scores that were assessed during RT ($p>0.05$). This study also found negative,statistically insignificant relationship between the disease duration and T_1 and T_3 ECOG scores, and a slightly positive, statistically insignificant relationship between disease duration and T_2 ECOG scores ($p>0.05$). A slightly positive, statistically significant relationship was determined between RT duration and T_1 ECOG score ($p>0.05$). Also, there was a slightly positive,statistically significant relationship between RT duration and T_2 and T_3 ECOG scores **($p=0.023$** and **$p=0.018$)** (Table 6).

Assessment of pain levels during RT by gender showed that the difference between VAS scores of male and female patients was not statistically significant ($p>0.05$).This study evaluated performance statuses by gender, and did not find a statistically significant difference between ECOG scores of female and male patients during RT ($p>0.05$) (Table 7).

Pain and performance statuses of patients were compared based on their cancer diagnoses; this study could make statistical calculations only for patients diagnosed with lung, prostate, and breast cancer because the rates of other diagnoses were found inadequate for statistical comparison. This study found the T_2 pain level of patients with lung, prostate, and breast cancer to be statistically significant**($p=0.040$).** According to the comparison, decrease in the T_3 pain level was considered high; it was not statistically significant ($p=0.066$).

In comparisons of patients' pain and performance statuses during RT based on the analgesic type they used, T_3 assessment of patients who took opioid drugs found their VAS and ECOG levels statistically significant **(p=0.007**and**p=0.006)** (Table 8).

Discussion

As a result of follow-up and assessments done during the treatment process of the participating RT patients with bone metastasis, this study determined that pain levels changed generally from severe to mild, and that patients' performance status improved. Within this study, during the treatment process, nurses monitored patients, assessed their pain levels and performance status, examined the patient, type of cancer, and factors that affected the treatment. Thus, it is expected that this study will lead the way for further studies in terms of "individualized radiotherapy" care. Moreover, the literature review showed that no studies on this issue have been conducted in Turkey. The fact that this study made a contribution to nursing care and it is the first study on this issue made this study unique and valuable.

The major complaint of patients with bone metastasis is pain. It begins suddenly, is not relievedby resting, rapidly aggravates, and requires a multidisciplinary approach. RT is the first preferred treatment method in the treatment of bone metastasis (Cetin and Büyükberber, 2012; Ozsaran, 2006). It is believed that radiotherapy affectspain mechanisms of decreasing inflammation on bone with pain palliation, inducing necrosis in cancer cells, reducing the secretion of chemical pain mediators with the effect of non-cancerous cells, developing decalcification and ossifications (Cole, 1989).

Radiotherapy relieves symptoms of patients and increased their quality of life. The Radiation Oncology Group (RTOG) defines optimal treatment: "It should provide relief at a maximum rate and speed and it should not place a financial burden" (Ozsaran, 2006). Randomized controlled studies and observational studies have reported that RT is effective in relieving the pain related to BM. A multi-centered prospective observational study examining patients' pain incidence and performances after palliative RT in the treatment of painful bone metastases determined that there was a decrease in T_3 pain scores ($p<0.001$), and that this decrease had a positive effect on the performance (Gomez-Iturriaga, 2015). Similarly, the present study measured T_1 and T_3 pains as severe (7–10 points) and mild (1–3 points), respectively, and determined that the pain was reduced. A statistically significant difference was found in patients' pain level assessments that were made during follow-up periods (T_1, T_2, T_3) **($p<0.001$).**

Performance status defines general well-being of cancer patients and is an indicator of the quality of life. Therefore, performance level, which is one of the most important parameters of treatment planning, should be assessed by nurses who regularly attend the patient at the beginning of treatment, during treatment, and after treatment (Oken, 1982). Because ECOG can be used not only for performance level, but also to assess quality of life of cancer patients, during RT, (T_1, T_2, T_3) ECOG scores were taken into consideration. This study determined that there was an increase in the participating patients' pain, and an inversion proportionalto performance level after the treatment.It was observed that patients' symptoms were reduced and their quality of life increased with this inversion proportion. The present study showed that palliative RT is an effective treatment option in BM patients, relieves symptoms, and increases the quality of life (National Cancer Institute at the National Institute of Health, 2010).

It is necessary for successful pain management to know factors that increase and reduce the pain that negatively affects cancer patients' quality of life and integrity. For effective pain management, nurses are responsible for defining the patient's pain, examining the affecting factors, making a pain assessment, and planning proper nursing initiatives (Eti Aslan and Badır, 2005; Uzunoglu and CiCin, 2011). The present study examined age, gender, diagnosis of disease, duration of disease, RT dose, and RT duration as factors that may affect pain and performance statuses. By assessing these factors, it is possible to determine patients' response to RT, treatment-related side effects, toxicity and its complications, and life-span expectations. This assessment may make a contribution to constructing correct and individualized care decisions (Erdine, 2003). Rather than

chronological age, functional age of the patients is more effective in selecting treatment and assessing toxicity in oncology. Moreover, any distinctions are made between young and old patients while RT treatment protocols are being planned. Study findings showed that age of the patient had no effect on pain and performance levels ($p>0.05$).Also, comparisons made according to participants' gender and disease durations did not show a significant difference in pain and performance scores.

In radiotherapy, single- or multiple-fraction doses of radiation are administered for pain palliation. Although national guides published by American Society for Radiation Oncology and American Radiology Association do not include discriminating definitions for complicated bone metastasis and bone metastasis without any complication, it has been reported that there are no difference between single- or multiple-fraction doses in palliative RT administrations for BM (Cheona, 2015). The present study did not make a distinction based on the dose given by patients, and no significant difference was found in comparisons made between pain and performance levels and radiation dose ($p>0.05$).

Although many cancer types cause BM that skeletal-related events such as severe bone pain, spinal cord compression and pathological fracture occur, it is more common in advanced lung, breast, and prostate cancers. BM occurs in advanced lung, breast, and prostate cancers at the rates of 40%, 75%, and 90%, respectively (Mayadagli, 2011; Hasbek, 2013; Gatta, 2015). Meeuse et al. conducted a study with painful BM cancer patients and reported that lung, breast, and prostate cancers were diagnoses that included the highest patient population (Lachgar, 2015). Most of the cases included in the present study were patients diagnosed with lung (33.3%), breast (21.3%), and prostate (16%) cancers. This is in good agreement with the literature. In the present study, patients' VAS and ECOG results were compared according to diagnosis, and in cancer diagnoses that are inadequate for a statistical comparison, pain and performance statuses were not statistically calculated. This study found T_2 pain level of those with lung, prostate and breast cancers, which constituted the majority of participants, to be statistically significant **($p= 0.040$)**.T_3 was compared, and the decrease in the pain level was considered high ($p=0.066$). A significant difference was not determined according to diagnosis of patients.

It is known that the incidence of bone metastasis is 25 times more common than primary bone tumors (Cetin and Büyükberber, 2011; Maccauro et al, 2011). The fact that BM is symptomatic makes researchers think that its real incidence is more than the determined (Cetin and Büyükberber, 2011; Rosselli Del Turco, 1994). In this study, a patient without pain (1.3%), BM as a subjective criterion, and patients who did not use an analgesic drug in the medical treatment and did not have a distinct symptom (5.3%), BM as an objective criterion, were assessed as asymptomatic.

In multidisciplinary approach of bone metastasis, analgesic drugs (NSAIDs, opioids) are included in supportive care in pain palliation. Selection of analgesic should be done based on the severity of pain and in accordance with the analgesic ladder principle determined by World Health Organization (WHO) (Uzunoglu and Cicin, 2011). The present study determined that half of the patients (52%) used NSAID as an analgesic, and almost half of them (42.7%) used opioid; a small number of participants did not use analgesic.VAS and ECOG levels of patients using opioid drugs were found statistically significant compared to those who did not use any analgesic or used NSAID drugs **($p=0.007$** and **$p=0.006$).**However, the fact that this study did not question whether there was a decrease in analgesic dose in the periods of T_2 and T_3 during RT, which is one of the study limitations, made researchers think that this may reflect negatively on the assessment of this result.

Study Limitations

The fact that this study included data collected in a single center can be considered the most important limitation. If this study is conducted with multi-centered and wider sample groups, different results can be obtained. In the period when the study data were collected, cures were paused for repair and maintenance of RT devices; thus, the completion of this study took a long time. Because some of the patients died in the follow-up period, this study was completed later than expected. When the RT decision was made, the researchers questioned the analgesic drug types that the patients used; however, this study did not assess the record of analgesics that

the patients used in the periods of T_2 and T_3 and whether there was a decrease in doses of analgesics. This study did not use any other measurement tool regarding quality of life of the participating patients. Thus, it could not make an objective assessment. Moreover, radiation dose administered to the sample group was not questioned. This study's results are limited to this study's data, cannot be generalized.

Conclusions

According to study results, it was determined that there was a reverse relationship between the pain and performance status of patients; as the pain patients suffered from reduced, their performance status improved. This study did not find a significant relationship between patients' pain and performance status during RT (T_1, T_2, T_3), and gender and duration of disease and radiation.

It is believed that nurses reduce patients' physical symptoms with an effective pain management after a pain assessment; accordingly they will have important effects in treatment compliance by providing a rapid improvement in performance statuses, increase in self-care adequacies, and enhance in patients' quality of lives.

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