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ORIGINAL ARTICLE

Determination of the Effect of Neuropathic Pain on Quality of Life in Cancer Patients Receiving Chemotherapy

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OBJECTIVE

This study aims to investigate the effect of neuropathic pain on quality of life in cancer patients receiving chemotherapy.

METHODS

This study included 100 patients with chemotherapy-induced neuropathic pain, recruited between April 2019 and October 2020 from the outpatient chemotherapy and inpatient oncology-hematology clinics of a foundation university hospital in Istanbul and the outpatient chemotherapy unit of a public hospital. Data were collected using the Chemotherapy-Related Peripheral Neuropathy Form, Visual Analog Scale, Neuropathic Pain Scale, and Neuropathic Pain Impact on Quality of Life Questionnaire.

RESULTS

The mean age of participants was 56.7±11.2 years; 42% were aged ≥61 and 62% were women. While 94% had received information about treatment and side effects, 74% attributed pain to the disease. Mean scores were 17.15±4.15 for neuropathic pain, 6.64±1.96 for pain intensity, and 147.56±62.44 for quality of life. Neuropathic pain intensity was higher in patients ≤50 years, women, employed individuals, and those receiving the third chemotherapy cycle compared to later cycles. The impact of neuropathic pain on quality of life was significantly greater in patients at the third versus fifth cycle and in those with color changes in the pain area ($p<0.05$). A strong positive correlation was observed between neuropathic pain and quality of life.

CONCLUSION

As neuropathic pain severity was associated with individual and treatment-related factors and with patients' quality of life, recommendations include routine assessment, patient and nurse education, and further evidence-based research.

Keywords: Cancer; chemotherapy; neuropathic pain; nursing; quality of life.

INTRODUCTION

Antineoplastic agents employed in cancer therapy not only suppress the division and proliferation of malignant cells but also exert cytotoxic effects on normal tissues, leading to adverse events such as peripheral neuropathy, anemia, diarrhea, fatigue, alopecia, and pain.[1,2] The reported incidence of chemotherapy-induced peripheral neuropathy (CIPN) varies considerably, ranging from 19% to 85%, depending on the chemotherapeutic regimen, cumulative dose, and duration of treatment.[3] Specifically, the prevalence has been doc-

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umented between 23% and 73% among patients receiving platinum-based regimens,[4] and between 61% and 92% in those treated with taxane-based regimens.[5]

Although the pathophysiology of chemotherapy-induced peripheral neuropathy (CIPN) has not yet been fully elucidated, several hypotheses suggest that multiple mechanisms contribute to its development.[6] The primary mechanism is thought to involve the ability of chemotherapeutic agents to penetrate the nervous system in the absence of a protective neurovascular barrier, thereby damaging peripheral sensory neurons and axons within the dorsal root ganglion.[7] Additionally, oxidative stress, mitochondrial dysfunction, myelin sheath degeneration, altered ion channel activity, immune-mediated processes, and neuroinflammation are recognized as contributing factors in the pathogenesis of CIPN.[1] Clinically, CIPN has been strongly associated with a range of chemotherapeutic classes, including taxanes (paclitaxel, docetaxel), platinum compounds (cisplatin, oxaliplatin, carboplatin), vinca alkaloids (vincristine, vinblastine), the immunomodulatory agent thalidomide, the proteasome inhibitor bortezomib, and targeted monoclonal antibodies such as brentuximab and trastuzumab.[8]

Currently, there is no established strategy for the prevention of chemotherapy-induced peripheral neuropathy (CIPN). Management efforts are primarily limited to modifying treatment duration or adjusting drug dosage.[6] Although both painful and non-painful manifestations of CIPN adversely influence patients' daily functioning and overall quality of life, the existing literature lacks comprehensive studies that concurrently evaluate the neuropathic pain characteristics and their impact on quality of life in affected individuals. Therefore, the present study was designed to address this gap and to contribute to the effective management of symptoms associated with CIPN, one of the most prevalent complications among patients receiving chemotherapy.

MATERIALS AND METHODS

Type and Design of the Study

This research employed a descriptive, cross-sectional design to investigate the characteristics of neuropathic pain among cancer patients undergoing chemotherapy and to evaluate its impact on quality of life.

Location and Time of the Study

Data collection was conducted between April 2019 and October 2019 at the outpatient chemotherapy unit and the inpatient oncology-hematology clinic of a private foundation university hospital in Istanbul, as well as at the outpatient chemotherapy unit of a public hospital. At these study sites, patients presenting with neuropathic symptoms were evaluated for peripheral neuropathy by physicians. Although patients were routinely informed about neuropathy as a potential adverse effect of chemotherapy, no structured training was provided regarding its systematic assessment.

Study Population and Sample

The study population comprised patients scheduled to undergo chemotherapy at the outpatient chemotherapy unit and the inpatient oncology-hematology clinic of a private foundation university hospital in Istanbul, as well as at the outpatient chemotherapy unit of a public hospital. No sampling method was employed; instead, all patients meeting the inclusion criteria during the study period were enrolled. Inclusion criteria were: A confirmed diagnosis with no prior chemotherapy, scheduled to receive regular chemotherapy at the study sites, a total Neuropathic Pain Scale (S-LANSS) score of 12 or higher, no ongoing neuropathy treatment, age over 18 years, willingness to communicate and cooperate, literacy, absence of hearing or visual impairments, and voluntary consent to participate. A total of 100 patients who met these criteria were included in the study. Exclusion criteria comprised patients who did not complete the planned treatment regimen, had to discontinue treatment due to health-related reasons, had a diagnosis of diabetes, or had bone metastases.

Data Collection Tools

Four instruments were utilized for data collection in this study. The Chemotherapy-Related Neuropathic Pain Data Collection Form was employed to obtain information on patients' sociodemographic characteristics, disease status, and treatment details. Pain intensity was assessed using the Visual Analog Scale (VAS). The Neuropathic Pain Impact on Quality of Life Questionnaire was administered to evaluate the effect of neuropathic pain on patients' quality of life. To identify the presence of neuropathic pain and determine eligibility for inclusion in the study, the Self-Leeds Assessment of Neuropathic Symptoms and Signs (S-LANSS) was used.

Chemotherapy-Related Neuropathic Pain Data Collection Form: The Chemotherapy-Related Neuropathic Pain Data Collection Form was developed by the researchers based on a review of relevant literature. The form comprises two sections. The first section, Patient Characteristics, includes 13 items addressing sociode-

mographic variables such as gender, age, marital status, educational level, employment status, family structure, identification and description of the caregiver, place of residence relative to the hospital, means of transportation to the hospital, health insurance status, and smoking and alcohol use. The second section, Disease and Treatment Characteristics, consists of 17 items examining clinical and treatment-related factors, including patient diagnosis, time since diagnosis, knowledge about the disease and planned treatment and its side effects, chemotherapy regimen and frequency, source of information, presence, cause, and frequency of pain, conditions accompanying pain, and comorbid chronic diseases along with their treatments. Overall, the form contains a total of 30 items.

VAS: The Visual Analog Scale (VAS), developed by Price et al.,[9] is a simple, reproducible, and minimally invasive method for the subjective assessment of pain intensity. It is frequently employed in clinical settings that require rapid evaluation of pain. The VAS consists of a 10 cm line, with one end representing "no pain" and the other end representing "the most severe pain imaginable" (0: No pain; 10: Most severe pain). Patients indicate their pain level by marking the line at the point corresponding to their perceived intensity. Pain severity is generally interpreted as follows: A score of 4 indicates mild pain, 5–6 indicates moderate pain, and 7–10 indicates severe pain. While the VAS is easy to administer, providing clear explanations of the scale endpoints to patients is crucial for obtaining reliable data. The literature supports the VAS as a practical, valid, and widely used tool for assessing cancer-related pain severity.

S-LANSS: The Self-Leeds Assessment of Neuropathic Symptoms and Signs (S-LANSS) is a modified version of the Leeds Assessment of Neuropathic Symptoms and Signs (LANSS) Pain Scale, developed by Bennett et al.,[10] designed to differentiate neuropathic pain from nociceptive pain. The validity and reliability of the scale were established by Koç.[11] Unlike the LANSS Pain Scale, which includes a two-item section completed by a physician, the S-LANSS allows patients to self-report these items without altering the scoring, maintaining equivalence with the original LANSS. Additionally, the S-LANSS incorporates a body map to assist patients in identifying the location of pain. Responses are recorded as "yes" or "no," with total scores ranging from 0 to 24. Patients scoring 12 or above are considered to experience neuropathic pain.

NePIQoL: The Neuropathic Pain Impact on Quality of Life Questionnaire (NePIQoL), developed by Poole et al.[12] and validated by Acar,[13] was designed to evaluate the impact of neuropathic pain on patients' quality of life. In its original form, the questionnaire is divided into six subscales:

(I) Symptoms – eight items assessing pain symptoms;

(II) Relationships – five items evaluating the effects of neuropathic pain on interpersonal relationships;

(III) Psychological – eight items assessing emotional well-being;

(IV) Social Relationships – eight items examining the influence of neuropathic pain on daily activities;

(V) Physical Activity – seven items assessing the impact of physical activity on pain and related symptoms; and

(VI) Personal Care – six items evaluating self-care in relation to neuropathic pain.

In the present study, analyses were based solely on the total NePIQoL score, and subscale scores were not considered.

The NePIQoL questionnaire comprises a total of 42 items, each rated on a 5-point Likert scale (5: Strongly agree/yes, always; 4: Agree/yes, most of the time; 3: Unsure/sometimes; 2: Disagree/rarely; 1: Strongly disagree/no, never). All items, except for items 12, 15, 33, and 34, are scored in descending order from 5 to 1, with the specified four items scored in reverse (1 to 5). The total score is obtained by summing all item scores, yielding a range of 42 to 210, with higher scores indicating a greater impact of neuropathic pain on quality of life. The internal consistency of the questionnaire was reported as 0.86 in the original study, 0.99 in the validity and reliability study, and was determined to be 0.95 in the present study.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics version 25.0. Quantitative variables were summarized as frequencies and percentages. The Kolmogorov-Smirnov test was employed to assess the normality of data distributions. For comparisons between two groups with normally distributed data, the Student's t-test was used, while one-way ANOVA was applied for comparisons among more than two normally distributed groups. For non-normally distributed data, the Mann-Whitney U test was used to compare two groups, and the Kruskal-Wallis test for more than two groups. Relationships between questionnaire scores were examined using Spearman's correlation analysis.

Application of the Study

Information regarding newly diagnosed patients was obtained from ward physicians and nurses. The date of data collection was scheduled based on the patient's appointment, as confirmed by ward nurses or secretaries. The ini-

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Table 1 Comparison of patients' descriptive characteristics according to vas and nepiqol mean scores

Descriptive characterists	n	%	VAS score		NePIQoL total score	
			Mean±SD	p	Mean±SD	p
Age, mean±SD (min–max)	56.73±11.227 (28–77)					
Under 50	32	32.0	6.59±0.84	**0.026**[*b]	146.56±23.52	0.058[a]
51–60	26	26.0	6.62±0.64	KW=7.301	138.23±20.56	KW=2.935
Aged 61 and over	42	42.0	6.19±1.04		131.83±30.2	
Gender						
Male	38	38.0	6.24±0.97	**0.043**[*b]	133.84±28.15	0.197[a]
Female	62	62.0	6.55±0.84	U=-2.025	140.89±25.14	U=1.299
Marital status						
Married	83	83.0	6.42±0.94	0.743[b]	138.19±26.82	0.989[a]
Single	17	17.0	6.47±0.72	KW=-0.328	138.29±25.06	KW=0.014
Education						
Primary school	46	46.0	6.46±0.91	0.736[b]	135.74±28.23	0.688[a]
High school	34	34.0	6.5±0.93	KW=-0.613	139.97±27.42	KW=-0.376
University	20	20.0	6.25±0.85		140.9±20.31	

*: p<0.05. [a]: Kruskall Wallis test and Mann Whitney U test; [b]: Studen T test. VAS: Visual analog scale; NePIQoL: Neuropathic pain impact on quality of life questionnaire; SD: Standard deviation

tial assessment was conducted using the Chemotherapy-Related Neuropathic Pain Data Collection Form prior to the commencement of chemotherapy. The second assessment was performed after the patient had completed at least two cycles of chemotherapy, using the study-specific forms. Prior to data collection, the researcher explained the purpose and procedures of the study to each patient and obtained written informed consent. Data were collected through face-to-face interviews conducted by the researcher during the patients' treatment sessions, with each interview lasting approximately 25 minutes.

Ethical Considerations

Prior to conducting the study, written approval was obtained from the University Clinical Research Ethics Committee (April 10, 2019; Approval No: 37068608-6100-15-1659), followed by written permission from the Istanbul Provincial Health Directorate. The study is conducted according to the Helsinki Declaration. Participation in the study was entirely voluntary, and written informed consent was obtained from all participants after the study purpose and procedures were fully explained. Additionally, written permission was secured for the use of all data collection instruments.

RESULTS

Table 1 presents the comparison of patients' demographic characteristics with their mean VAS and NePIQoL scores. The mean age of participants was 56.73±11.23 years; 62% were female, 83% were married, and 46% had completed primary education.

Analysis of mean VAS scores by age revealed a statistically significant difference among groups (p<0.05). Pairwise comparisons indicated that patients aged 50 years and younger had significantly higher VAS pain scores than those over 61 years of age (Kruskal-Wallis test, t=7.301, p=0.036). When analyzed by gender, women had higher mean VAS scores than men, with the difference reaching statistical significance (p<0.05). Although higher mean VAS scores were observed in unmarried patients and those with a high school education, these differences were not statistically significant (p>0.05).

Regarding NePIQoL scores, the mean values tended to decrease with increasing age and increase with lower educational levels; higher scores were also observed among women and married patients. However, differences in NePIQoL scores across demographic groups were not statistically significant (p>0.05).

Comparison of Patients' Disease Characteristics with VAS and NePIQoL Scores

Table 2 presents the comparison of patients' disease characteristics with their mean VAS and NePIQoL scores. Among the participants, 43% were diagnosed with breast cancer, and 51% reported receiving information about their disease, treatment, and potential side effects from both physicians and nurses.

Table 2 Comparison of patients' disease characteristics according to vas and nepiqol mean scores

Disease characteristics	n	%	VAS score		NePIQoL total score	
			Mean±SD	p	Mean±SD	p
Diagnosis						
Breast cancer	43	43.0	6.59±0.84	0.112[b]	146.95±23.73	0.089[a]
Colon cancer	27	27.0	6.62±0.64	KW=8.928	125.83±16.45	F=1.979
Lung cancer	12	12.0	6.19±1.04		136.0±25.64	
Lymphoma	5	5.0	6.29±0.49		127.43±21.85	
Ovarian cancer	7	7.0	6.2±0.45		134.8±34.12	
Gastric cancer	6	6.0	6.41±1.08		133.7±31.03	
Person providing information about the disease, treatment, and side effects						
Physician	36	36.0	6.39±0.9	0.339	138.58±31.15	0.636
Nurse	13	13.0	6.85±0.99	KW=2.165	144.23±28.69	F=0.455
Physician and nurse	51	51.0	6.35±0.87		136.41±22.17	

[a]: ANOVA test; [b]: Kruskall Wallis test. VAS: Visual analog scale; NePIQoL: Neuropathic pain impact on quality of life questionnaire; SD: Standard deviation

Although mean VAS and NePIQoL scores were higher in patients with breast cancer and in those who were informed by both healthcare professionals, these differences were not statistically significant (p>0.05).

Table 3 presents the comparison of patients' treatment characteristics with their mean VAS and NePIQoL scores. Among the participants, 35% received alkylating agents as part of their chemotherapy regimen, 40% were at their third chemotherapy cycle during the second assessment, and 55% received treatment at 14-day intervals. Seventy-four percent of patients reported disease-related pain, and 79% experienced pain between chemotherapy sessions.

Analysis of mean VAS scores according to the number of chemotherapy cycles revealed a statistically significant difference between groups (p<0.05). Pairwise comparisons indicated that this difference was primarily due to variations in mean VAS scores between patients at different cycles. Specifically, the VAS score of patients receiving the second cycle was lower than that of patients in the fifth cycle (Kruskal-Wallis test, t=10.951, p=0.029). Additionally, patients in the third cycle reported higher VAS scores than those in the fourth (Kruskal-Wallis test, t=10.951, p=0.019) and fifth cycles (Kruskal-Wallis test, t=10.951, p=0.006), with all differences reaching statistical significance.

Comparison of NePIQoL scores by chemotherapy regimen revealed a statistically significant difference between groups (p<0.01). Pairwise analysis indicated that patients in their third chemotherapy cycle had significantly higher NePIQoL scores compared to those in the fifth cycle (One-Way ANOVA, t=4.710, p=0.003).

Although patients receiving alkaloid-based chemotherapy, those treated every 14 days, those identifying disease as the source of pain, and those reporting pain during chemotherapy sessions but not between sessions had higher mean VAS and NePIQoL scores, these differences were not statistically significant (p>0.05).

Table 4 presents the comparison of patients' pain characteristics with mean VAS and NePIQoL scores. Among participants, 91% reported tingling, prickling, or pins-and-needles sensations in the painful area, 73% reported diminished sensation when the area was rubbed, and 70% reported hypersensitivity to touch in the affected region.

Patients who experienced color changes in the pain area during intensification reported significantly higher NePIQoL scores, with the difference between groups reaching statistical significance (p<0.01).

Analysis of mean VAS scores across pain characteristics indicated that patients generally did not experience throbbing, stinging, or tingling; experienced color changes during pain intensification; reported hypersensitivity to touch; did not feel electric-shock-like, jumping, or bursting sensations at rest; experienced increased heat in the painful area; did not lose sensation when the area was rubbed; and experienced partial loss of sensation when pressing the area. However, differences in mean VAS scores across these pain characteristics were not statistically significant (p>0.05).

Similarly, mean NePIQoL scores were higher among patients who did not report tingling, prickling, or pins-and-needles; experienced hypersensitivity to touch when pain intensified; did not experience electric-shock, jumping, or bursting sensations at rest; experienced increased heat; and did not report loss of sensation when

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Table 3 Comparison of patients' treatment characteristics according to vas and nepiqol mean scores

Treatment characteristics	n	%	VAS score		NePIQoL total score	
			Mean±SD	p	Mean±SD	p
Chemotherapy protocol						
Alkylatin agents	35	35.0	6.4±0.91	0.869[b]	144.2±23.52	0.249[a]
Alkaloid agents	34	34.0	6.5±0.75	KW=0.280	135.47±25.21	F=1.409
Antimetabolite agents	31	31.0	6.39±1.05		134.45±30.18	
Number of chemotherapy cycles						
2. Cycle	15	15.0	6.53±0.64	p=0.012*[b]	134.87±20.65	0.004**[a]
3. Cycle	40	40.0	6.73±0.91	KW=10.951	147.43±25.34	KW=4.710
4. Cycle	33	33.0	6.21±0.96		136.09±27.48	
5. Cycle	12	12.0	5.92±0.67		117.5±21.37	
Frequency of chemotherapy						
Once a week	24	24.0	6.33±0.82	0.636[b]	133.0±25.2	0.309[a]
Every 14 days	55	55.0	6.51±1.0	KW=0.906	141.85±27.99	KW=1.189
Every 21 days	21	21.0	6.33±0.73		134.62±22.9	
Opinion on the cause of pain						
Disease-related	74	74.0	6.41±0.92	0.718[b]	138.73±27.35	0.742[a]
Chemotherapy-related	26	26.0	6.5±0.86	KW=0.361	136.73±23.98	KW=0.331
Frequency of pain						
There is pain during chemotherapy, but no pain between chemotherapy sessions	21	21.0	6.52±0.81	0.642[b] KW=0.466	143.33±25.95	0.320[a] KW=1.000
There is no pain during chemotherapy, but there is pain between chemotherapy sessions	79	79.0	6.41±0.93		136.85±26.52	

*: p<0.05; **: p<0.01. [a]: ANOVA test; [b]: Kruskall Wallis test. VAS: Visual analog scale; NePIQoL: Neuropathic pain impact on quality of life questionnaire; SD: Standard deviation

rubbing or pressing the painful area. Nevertheless, these differences were not statistically significant (p>0.05).

Table 5 presents the distribution of patients' mean scores on the VAS, S-LANSS, and NePIQoL questionnaires. The mean VAS score was 6.64±1.96, indicating moderate to severe pain. The mean S-LANSS score was 17.15±4.15, confirming the presence of neuropathic pain in the sample. The mean NePIQoL score was 147.56±62.44, reflecting a substantial impact of neuropathic pain on patients' quality of life.

Table 6 presents the correlation analysis between patients' VAS, S-LANSS, and NePIQoL scores. A positive, weakly significant correlation was observed between VAS and S-LANSS scores (r=0.305, p<0.01). A positive, strongly significant correlation was found between VAS and NePIQoL scores (r=0.728, p<0.01). Additionally, a positive, weakly significant correlation was identified between S-LANSS and NePIQoL scores (r=0.356, p<0.01). These findings suggest that higher pain intensity and neuropathic symptom severity are associated with greater impact on quality of life.

DISCUSSION

This study aimed to investigate the impact of neuropathic pain on the quality of life in cancer patients undergoing chemotherapy. The findings indicated that the mean S-LANSS score among patients with neuropathic pain was 17.15±4.15, while the mean pain intensity measured by VAS was 6.64±1.96, corresponding to a moderate level of pain. The mean NePIQoL score was 147.56±62.44, reflecting a substantial impact of neuropathic pain on patients' quality of life (Table 5).

In the present study, pain intensity was examined according to age groups among patients with a mean age of 56.73±11.23 years. It was found that patients aged 50 years and younger reported higher pain intensity compared to those aged 61 years and older (p=0.036) (Table 1).

Consistent with these findings, Wong et al.[14] investigated age-related differences in subjective (e.g., pain intensity, interference with activities) and objective (e.g., light touch, vibration) measures of chemotherapy-

Table 4 Comparison of patients' pain characteristics according to vas and nepiqol mean scores

Pain characteristics	n	%	VAS score		NePIQoL total score	
			Mean±SD	p	Mean±SD	p
In the area where you have pain, do you also have "pins and needles", tingling or prickling sensations?						
Yes	91	91.0	6.43±0.92	0.954	138.09±27.47	0.785
No	9	9.0	6.44±0.73	U=405.0	139.44±11.93	t=-0.276
Does the painful area change colour when the pain is particularly bad?						
Yes	39	39.0	6.59±1.04	0.190	147.21±25.77	0.006**
No	61	61.0	6.33±0.79	U=1016.0	132.46±25.38	t=2.817
Does your pain make the affected skin abnormally sensitive to touch?						
Yes	70	70.0	6.44±0.9	0.828	139.6±24.13	p=0.424
No	30	30.0	6.4±0.93	U=1023.0	134.97±31.3	t=0.803
Does your pain come on suddenly and in bursts for no apparent reason when you are completely still?						
Yes	11	11.0	6.27±0.47	0.506	136.0±12.98	0.616
No	89	89.0	6.45±0.94	U=433.0	138.48±27.66	t=-0.508
In the area where you have pain, does your skin feel unusually hot like a burning pain?						
Yes	55	55.0	6.45±0.86	0.4439	142.33±24.52	0.085
No	45	45.0	6.4±0.96	U=1133.0	133.18±28.01	t=1.741
Gently rub the painful area with your index finger and then rub a non-painful area. How does this rubbing feel in the painful area?						
Yes	73	73.0	6.41±0.86	0.663	136.97±27.25	0.444
No	27	27.0	6.48±1.01	U=933.0	141.56±24.17	t=-0.769
Gently press on the painful area with your finger tip and then gently press in the same way onto a non-painful area. How does this feel in the painful area?						
Yes	59	59.0	6.47±0.92	0.557	135.83±29.59	0.253
No	41	41.0	6.37±0.89	U=1131.0	141.63±20.89	t=-1.150

Student T test, Mann-Whitney-U test. **: p<0.01. VAS: Visual analog scale; NePIQoL: Neuropathic pain impact on quality of life questionnaire; SD: Standard deviation

Table 5 Distribution of patients' VAS, S-LANSS and NePIQoL scores

Scales	Mean±SD	Min	Max
VAS	6.64±1.96	1	10
S-LANSS	17.15±4.15	0	24
NePIQoL	147.56±62.44	42	210

VAS: Visual analog scale; S-LANSS: Neuropathic pain scale; NePIQoL: Neuropathic pain impact on quality of life questionnaire; SD: Standard deviation

Table 6 Correlation between patients' VAS, S-LANSS and NePIQoL scores

		VAS	S-LANSS	NePIQoL
VAS	r	1.000		
	p	0.000		
S-LANSS	r	0.305**	1	
	p	0.002	0.000	
NePIQoL	r	0.728**	0.356**	1
	p	0.001	0.001	0.000

Spearmans's Test. **: p<0.01. VAS: Visual analog scale; S-LANSS: Neuropathic pain scale; NePIQoL: Neuropathic pain impact on quality of life questionnaire

related peripheral neuropathy in 425 cancer patients with a mean age of 60.9±10.5 years over a three-month period. They reported that patients under 65 years of age (mean age: 54.52±8.01) subjectively experienced more severe pain and activity impairment despite objective measures, whereas patients over 65 years (mean age: 70.90±4.48) reported less severe pain and functional limitations, also contrary to objective assessments.

Similarly, Waddell-Bulls et al.[15] examined the relationship between chemotherapy-induced peripheral neuropathy and age in patients with gynecological cancer over a one-year follow-up period. Symptom progression was monitored from the start of chemotherapy until one year post-treatment. Although both age groups exhibited similar neuropathy symptoms during the treatment period, patients under 65 years showed greater symptom reduction after treatment completion compared to those over 65, with no differences in treatment regimens observed between the groups.

The findings of the present study regarding age are consistent with the existing literature. They suggest that the tendency for older patients to report lower levels of

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neuropathic pain intensity should be carefully considered, and that neuropathy assessment should incorporate both objective and subjective evaluation methods.

In the present study, women reported higher pain intensity than men (p=0.043) (Table 1). This finding aligns with previous research indicating that women generally have a lower neuropathic pain threshold than men and may respond differently to pain due to physiological factors, including hormonal fluctuations during menarche and pregnancy, as well as psychosocial influences such as family and social relationships.[16]

Experimental animal studies by Naji-Esfahani et al.[17] examining gender differences in chemotherapy-induced neuropathic pain in mice treated with Paclitaxel and Cisplatin reported a higher prevalence of Paclitaxel-related symptoms in female mice. Similarly, large-scale human studies have consistently shown higher pain intensity among women. Mols et al.,[18] in a study involving 1.102 patients using the European Organization for Research and Treatment of Cancer questionnaire, found that women experienced greater pain intensity than men. Sacid and Arıkan[19] reported similar findings in a sample of 196 cancer patients, where women demonstrated higher pain levels affecting daily activities and quality of life.

In Colombia, Martínez et al.[20] investigated chemotherapy-induced peripheral neuropathy (CIPN) in 1.551 patients, of whom 1.094 were women. Among these female patients, 521 (33.6%) had breast cancer and 80 (5.2%) had ovarian cancer; all received Ixabepilone, a chemotherapeutic agent commonly used in breast cancer treatment, and 95.2% developed CIPN. Incidences of CIPN in women treated with Paclitaxel, Docetaxel, Oxaliplatin, and Bortezomib were 52%, 48.5%, 56%, and 65.3%, respectively. In the present study, half of the female patients had breast or ovarian cancer (43% breast cancer, 7% ovarian cancer) (Table 2). The higher pain intensity observed in female patients may be attributed to the greater prevalence of chemotherapy agents in cancer types commonly affecting women, which are known to induce CIPN.

In the present study, a statistically significant difference in pain intensity was observed according to the number of chemotherapy cycles received by patients after the second assessment (p=0.012), with the difference primarily attributable to patients in the second and third cycles reporting pain levels that differed from those in other cycle groups (Table 3).

Consistent with these findings, Sacid and Arıkan[19] reported that pain intensity increased with the number of chemotherapy cycles in patients undergoing treatment, demonstrating a cumulative effect of chemotherapy on neuropathic pain and its interference with daily activities and quality of life. In the current study, the greater impact on quality of life observed in patients receiving the third cycle was attributed to their higher pain intensity compared to those in the fourth and fifth cycles. Similarly, Shimozuma et al.[21] noted that chemotherapy-induced peripheral neuropathy (CIPN) symptoms adversely affected quality of life in breast cancer patients after the seventh cycle, highlighting the progressive influence of cumulative chemotherapy exposure on pain and functional outcomes.

In the present study, contrary to some literature reports, the observed decrease in pain intensity with an increasing number of chemotherapy cycles is thought to reflect patients' initial perception of neuropathic pain and subsequent adaptation over time. Similarly, the reduction in the impact of pain on quality of life with additional cycles may be related to the corresponding decrease in pain intensity. Nevertheless, further studies with robust evidence are needed to clarify the effects of chemotherapy cycle number on neuropathic pain intensity and quality of life, which would substantially inform the clinical management and diagnosis of neuropathic pain.

Additionally, a positive and highly significant correlation was observed between neuropathic pain intensity and its impact on quality of life (p<0.01) (Table 6), indicating that higher pain intensity is associated with a greater negative effect on patients' quality of life.

This study demonstrated that the presence of neuropathic pain adversely affected quality of life and was associated with increased pain intensity. In other words, as neuropathic pain symptoms intensified, both the severity of pain and its negative impact on patients' quality of life increased. Consistent with these findings, Simon et al.[22] reported that patients' quality of life decreased as symptom severity increased. A systematic review by Mols et al.,[23] encompassing 25 studies, also concluded that chemotherapy-induced peripheral neuropathy (CIPN) negatively impacts quality of life. Similarly, Önsüz[24] found that quality of life declined in patients receiving taxane-based chemotherapy as neuropathy severity increased.

In a retrospective study by Streckmann et al.[25] involving 188 patients treated with oxaliplatin, chemotherapy-induced neuropathic pain was evaluated, and results indicated a reduction in quality of life with increasing neuropathy severity. Smith et al.[26] similarly reported a statistically significant association between peripheral neuropathy and decreased quality of life. Pereira et al.,[27] in a study of 58 patients receiving

oxaliplatin or taxane-based chemotherapy who experienced neuropathy, found that patients were particularly affected by numbness, tingling, and cold sensations in the extremities, leading to increased dependence on others and a consequent reduction in quality of life.

Limitations of the Study

The findings of this study are based on a sample of volunteer patients who received chemotherapy at two institutions in Istanbul—one private foundation hospital and one public hospital—during a specific time period and who met the inclusion criteria. Therefore, the results may not be generalizable to all patients receiving chemotherapy.

CONCLUSION

According to the results of this study, the severity of neuropathic pain was found to be affected by the patients' age, gender, number of chemotherapy cycles, and pain characteristics; as pain severity increased, its impact on quality of life also increased.

In line with these results; individual and treatment characteristics of patients should be considered in the assessment of neuropathic pain; the assessment and importance of neuropathic pain should be included in patient education and pre- and post-graduate nursing education; quantitative and qualitative studies should be conducted involving different patient groups in terms of individual and treatment characteristics, examining neuropathic pain characteristics and their impact on quality of life.

Ethics Committee Approval: The study was approved by the Yeditepe University Clinical Research Ethics Committee (no: 37068608-6100-15-1659, date: 10/04/2019).

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REFERENCES

1. Zajaczkowska R, Kocot-Kępska M, Leppert W, Wrzosek A, Mika J, Wordliczek J. Mechanisms of chemotherapy-induced peripheral neuropathy. Int J Mol Sci 2019;20(6):1451.
2. Pearce A, Haas M, Viney R, Pearson SA, Haywood P, Brown C, et al. Incidence and severity of self-reported chemotherapy side effects in routine care: A prospective cohort study. PLoS One 2017;12(10):e0184360.
3. Loprinzi CL, Lacchetti C, Bleeker J, Cavaletti G, Chauhan C, Hertz DL, et al. Prevention and management of chemotherapy-induced peripheral neuropathy in survivors of adult cancers: ASCO guideline update. J Clin Oncol 2020;38(28):3325–48.
4. Mazilu L, Stănculeanu DL, Gheorghe AD, Voinea F, Suceveanu AP, Pițuru S, et al. Incidence of chemotherapy-induced peripheral neuropathy in cancer patients in clinical practice. Age 2019;57(13.21):60–8.
5. Colvin LA. Chemotherapy-induced peripheral neuropathy: Where are we now? Pain 2019;160(1):1–10.
6. Li T, Mizrahi D, Goldstein D, Kiernan MC, Park SB. Chemotherapy and peripheral neuropathy. Neurol Sci 2021;42(10):4109–21.
7. Lees JG, Makker PG, Tonkin RS, Abdulla M, Park SB, Goldstein D, et al. Immune-mediated processes implicated in chemotherapy-induced peripheral neuropathy. Eur J Cancer 2017;73:22–9.
8. Shah A, Hoffman EM, Mauermann ML, Loprinzi CL, Windebank AJ, Klein CJ, et al. Incidence and disease burden of chemotherapy-induced peripheral neuropathy in a population-based cohort. J Neurol Neurosurg Psychiatry 2018;89(6):636–41.
9. Price DD, McGrath PA, Rafii A, Buckingham B. The validation of visual analogue scales as ratio scale measures for chronic and experimental pain. Pain 1983;17(1):45–56.
10. Bennett M, Smith B, Torrance N, Potter J. The S-LANSS score for identifying pain of predominantly neuropathic origin: Validation for use in clinical and postal research. J Pain 2005;6(3):149–58.
11. Koç R. S-LANSS (Self-Leeds Assessment of Neuropathic Symptoms and Sign) Validity and reliability study of the Turkish version of the pain scale. Kırıkkale: Kırıkkale University; 2008.
12. Poole H, Murphy P, Nurmikko T. Development and preliminary validation of the NePIQoL: A quality-of-life measure for neuropathic pain. J Pain Symptom Manage 2009;37(2):233–45.
13. Acar B. NePIQoL (Neuropathic Pain Impact on Quality-of-Life Questionnaire) Validity and reliability study of the Turkish version of the questionnaire on the impact of neuropathic pain on quality of life. Kırıkkale: Kırıkkale University; 2014.

Turk J Oncol 2025;40(4):293–302
doi: 10.5505/tjo.2025.4698

14. Wong ML, Cooper BA, Paul SM, Abrams G, Topp K, Kober KM, et al. Age-related differences in patient-reported and objective measures of chemotherapy-induced peripheral neuropathy among cancer survivors. Support Care Cancer 2019;27(10):3905–12.
15. Waddell Bulls H, Hoogland AI, Kennedy B, James BW, Arboleda BL, Apte S, et al. A longitudinal examination of associations between age and chemotherapy-induced peripheral neuropathy in patients with gynecologic cancer. Gynecol Oncol 2019;152(2):310–5.
16. Lombana W, Vidál SE. Pain and gender differences: A clinical approach. Rev Colomb Anestesiol 2012;40(3):207–12.
17. Naji-Esfahani H, Vaseghi G, Safaeian L, Pilehvarian AA, Abed A, Rafieian-Kopaei M. Gender differences in a mouse model of chemotherapy-induced neuropathic pain. Lab Anim 2016;50(1):5–20.
18. Mols F, van de Poll-Franse LV, Vreugdenhil G, Beijers AJ, Kieffer JM, Aaronson NK, et al. Reference data of the European Organisation for Research and Treatment of Cancer (EORTC) QLQ-CIPN20 questionnaire in the general Dutch population. Eur J Cancer 2016;69:28–38.
19. Sacid G, Arıkan F. The evaluation of peripheral neuropathy, daily life activities and quality of life in cancer patients. Acta Oncol Turc 2020;53(3):429–40.
20. Martínez JW, Naranjo JS, de los Ríos PAL, Mejía CAI, Urrea JS, Muñoz MM, et al. Prevalencia de neuropatía periférica asociada a quimioterapia en cuatro centros oncológicos de Colombia. Rev Neurol 2019;69(3):94–8.
21. Shimozuma K, Ohashi Y, Takeuchi A, Aranishi T, Morita S, Kuroi K, et al. Taxane-induced peripheral neuropathy and health-related quality of life in post-operative breast cancer patients undergoing adjuvant chemotherapy: N-SAS BC 02, a randomized clinical trial. Support Care Cancer 2012;20(12):3355–64.
22. Simon NB, Danso MA, Alberico TA, Basch E, Bennett AV. The prevalence and pattern of chemotherapy-induced peripheral neuropathy among women with breast cancer receiving care in a large community oncology practice. Qual Life Res 2017;26(10):2763–72.
23. Mols F, Beijers T, Vreugdenhil G, van de Poll-Franse L. Chemotherapy-induced peripheral neuropathy and its association with quality of life: A systematic review. Support Care Cancer 2014;22(8):2261–9.
24. Önsüz Ü. The effectiveness of interventions applied by patients in the management of peripheral neuropathy occurring in cancer patients receiving taxane-based therapy. İstanbul: İstanbul University; 2015.
25. Streckmann F, Zopf EM, Lehmann HC, May K, Rizza J, Zimmer P, et al. Exercise intervention studies in patients with peripheral neuropathy: A systematic review. Sports Med 2014;44(9):1289–304.
26. Smith LME, Knoerl R, Yang JJ, Kanwaze-Lee G, Lee D, Bridges CM. In search of a gold standard patient-reported outcome measure for use in chemotherapy-induced peripheral neuropathy clinical trials. Cancer Control 2018;25(1):1–10.
27. Pereira S, Fontes F, Sonin T, Dias T, Fragoso M, Castro-Lopez JM, et al. Chemotherapy-induced peripheral neuropathy after neoadjuvant or adjuvant treatment of breast cancer: A prospective cohort study. Support Care Cancer 2016;24(4):1571–81.