Original Article

Association Between Chemotherapy-Induced Pain Intensity and Pain Interference among Breast Cancer Patients

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ABSTRACT

OBJECTIVE: The purpose of this study was to examine the correlation between chemotherapy-induced pain intensity and pain interference and their subscales among patients with breast cancer undergoing chemotherapy.

METHODOLOGY: A cross-sectional study was conducted among 92 breast cancer patients undergoing chemotherapy from December 2024 to April 2025 at two hospitals in Medan, Indonesia, using consecutive sampling. Pain intensity was measured using the Visual Analog Scale, and pain interference was assessed using the Brief Pain Inventory. Data were analyzed using the Spearman signed-rank correlation test.

RESULTS: The mean pain intensity was 5.51 ± 1.52, with 63% of participants reporting moderate and 31.6% severe pain. Throbbing (96.7%) and aching (84.8%) were the most common pain sensations. Most participants (76.1%) received taxane-based chemotherapy regimens, and 69.6% had not undergone mastectomy. Overall pain interference was low (mean = 0.44 ± 0.90), with work (0.89 ± 1.48) and general activity (0.82 ± 1.49) being the most affected subscales, while relationships with others were unaffected. Pain intensity showed a significant positive correlation with total pain interference (r = 0.522, p < 0.001), as well as with general activity, work, mood, walking ability, and sleep subscales, but no significant correlation with enjoyment of life (r = 0.140, p = 0.184).

CONCLUSION: Pain intensity in breast cancer patients was significantly correlated with pain interference and their subscales. Therefore, nurses should minimize the impact of pain on the breast cancer patients' daily activities.

KEYWORDS: breast cancer, chemotherapy, pain intensity, pain interference

INTRODUCTION

Globally, according to a 2022 World Health Organization [WHO] report, cancer is the leading cause of death worldwide, accounting for 1 in 6 deaths, with an estimated 10 million deaths [1]. In Indonesia, the number of cancer cases in 2020 reached 348,809 with 207,210 deaths, where breast cancer had the highest incidence rate at 16.7% with a mortality rate of 11.0%, followed by cervical cancer at 9.3% with a mortality rate of 8.8%, colorectal cancer at 8.6% with a mortality rate of 7.9%, and lung cancer at 8.6% with a relatively high mortality rate of 12.6% [2].

Breast cancer is the most prevalent type of cancer in the world and the primary cause of cancer-related deaths among women. In addition to death, pain is the thing most feared by cancer patients. The International Association for the Study of Pain [IASP] states that pain is an "unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage" [3]. The European Society for Medical Oncology (ESMO) states that this condition is experienced by more than 60% of cancer patients who have metastases or are in the final stages of the disease [4].

One of the main treatment modalities for breast cancer is chemotherapy. Although effective in treating cancer, chemotherapy often causes significant side effects. Chemotherapy-induced pain (CIP) is a common and troublesome clinical problem. The most common form of CIP is chemotherapy-induced peripheral neuropathy (CIPN), which is reported to occur in more than 60% of patients receiving neurotoxic agents, such as taxane-based regimens [5]

Cancer pain affects patients' daily lives, disrupts individual functioning, reduces patients' quality of life, and impacts their ability to participate in social activities and relationships. Pain interference is defined as a disruption of daily activities caused by unpleasant sensations.

Previous studies have consistently shown a strong positive correlation between pain intensity and pain interference. Among cancer patients, higher pain intensity scores were associated with significantly greater interference in daily activities, work, and mood [6]. However, research in developing countries is still limited. In Gondar, northwestern Ethiopia, among 76 cancer patients, nearly half (48.2%) reported moderate levels of pain interference [7].

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Several factors, such as metastasis, cancer severity, and treatment received, and their combination, will affect pain and pain interference[8,9]. Although the correlation between pain intensity and pain interference has been widely established, specific data examining this relationship in the context of the Indonesian population, which has a unique cultural background that may influence pain reporting, is still lacking. Therefore, understanding the relationship between pain intensity and pain interference is important for holistic pain management nursing.

METHODOLOGY

Study Design

This correlational cross-sectional study evaluated the relationship between pain intensity and pain interference, including subscales, in breast cancer patients undergoing chemotherapy. Data were obtained from a secondary analysis of a Randomized Control Trial (RCT) study conducted between December 2024 and April 2025.

Population and Sample

This study involved 92 breast cancer patients undergoing chemotherapy, consecutively recruited at the One Day Care (ODC) Cancer Unit at Adam Malik Hospital, and at the chemotherapy ward at Prof. Dr Chairuddin P. Lubis Universitas Sumatera Utara Hospital in Medan, Indonesia. The inclusion criteria were women aged >20 years, undergoing chemotherapy cycles 1-5, experiencing pain, cognitively able to follow instructions, and not using sedatives or narcotics. Exclusion criteria were symptoms of vertigo or vomiting during therapy, worsening clinical condition, or mental/physical limitation.

Instrument

The Visual Analog Scale (VAS) was used to assess pain intensity, and the Brief Pain Inventory (BPI) was used to measure pain interference.

Data Analysis

The Kolmogorov–Smirnov test showed a non-normal data distribution ($p < 0.001$); thus, the Spearman Signed-Rank correlation test was used to assess the relationship between pain intensity and pain interference.

Ethical Statement

Ethical approval was obtained from the Health Research Ethics Committee of Universitas Sumatera Utara No: 311/KEPK/USU/2024. Participants provided written informed consent and could withdraw from the study at any time without consequences.

RESULTS

Characteristic of Study Participants

Table I shows the characteristics of the study's participants, who were generally middle-aged adults (mean age = 51 ± 9.82 years; range = 26 to 71 years). More than half of the respondents were homemakers. The majority of participants had a chemotherapy interval of 21 days, and the rest had a 30-day interval. The majority of participants used taxane-based chemotherapy regimens, either anthracycline-combined taxane, HER2-targeted taxane, or single taxane. More than half of the participants did not undergo a mastectomy procedure, and only a few underwent mastectomy surgery.

Table I:
Characteristics of Study Participants (n=92)

Characteristics	f	%
Age (year)		
19–39 years (Young adult)	10	11
40–59 years (Middle-aged adult)	63	69
60–69 years (Young elderly)	18	20
70–79 years (Elderly)	1	1
Mean ± SD (min-max) = 51 ± 9.82 (26-71)		
Occupation		
Employer	13	14.1
Farmer	9	9.8
Self-employed	9	9.8
Homemaker	61	66.3
Chemotherapy interval		
21 days	75	81.5
31 days	17	18.5
Chemotherapy regimen		
Taxane+Anthracycline combination	25	27.2
Taxane+HER2-targeted combination	21	22.8
Taxane-based	16	17.4
Anthracycline-based	8	8.7
HER2-targeted	4	4.3
Others	18	19.6
Surgical history		
Non-Mastectomy	64	69.6
Post-Mastectomy	28	30.4

Pain Intensity and Pain Interference Scores of Participants

Table II shows the pain intensity and pain inference of this study. More than half of the participants reported moderate pain intensity, followed by severe pain (5.51±1.52, range 3-8). In general, pain interference was low (0.44 ± 0.90), ranging from 0 to 6.14. Based on the pain interference subscale, work was the most disturbing subscale (0.88 ± 1.48), followed by general activities (0.82 ± 1.49).

Pain Characteristics and Description

Table III shows the characteristics and descriptions of pain experienced by participants. More than half of respondents reported not taking pain medication, and more than one-third reported pain returning more than 12 hours after taking pain medication. The majority of participants stated that the pain was related to the

underlying disease, and only a small proportion believed the effects of treatment caused the pain. Nearly half reported never using pain medication, nearly one-third reported taking it only when needed, and the remaining used it regularly. Participants most frequently described pain sensations as throbbing and aching, and none described pain as penetrating, nagging, or miserable.

Table II: Pain Intensity and Pain Interference Scores of Participants (n = 92)

Variable	Mean ± SD	Min-max
Pain intensity (VAS)	5.51 ± 1.52	3-8
Pain interference (BPI)	0.44 ± 0.90	0-6.14
General activity	0.82 ± 1.49	0-9
Mood	0.21 ± 0.94	0-8
Walking ability	0.67 ± 1.46	0-10
Work	0.89 ± 1.48	0-9
Sleep	0.38 ± 1.19	0-9
Enjoyment of life	0.13 ± 0.95	0-9

Table III: Pain Characteristics and Descriptions Reported by Study Participants (n=92)

Variable	f	%
Time taken before pain returns after taking pain medication		
5–12 hours	8	8.7
More than 12 hours	35	38
Do not take pain medication	49	53.3
Cause of pain according to the patient		
Effect of treatment	9	9.8
Primary disease	83	90.2
Habit of using pain medicine		
Do not take	44	47.8
On a regular basis	19	20.7
Only when necessary	29	31.5
Pain description		
Throbbing	89	96.7
Aching	78	84.8
Stabbing	40	43.5
Gnawing	18	19.6
Sharp	17	18.5
Tender	9	9.8
Exhausting	8	8.7
Tiring	6	6.5
Burning	5	5.4
Numb	1	1.1
Unbearable	1	1.1

Correlation Between Pain Intensity and Pain Interference (Total and Subscales)

Table IV shows the correlation result. There was a significant positive correlation between pain intensity and pain interference ($r = 0.522$, $p < 0.001$). This finding indicates that higher pain intensity is associated with limitations in the daily activities of breast cancer patients. The correlation of pain intensity with the pain interference subscales showed that the general activity subscale ($r = 0.553$, $p = 0.001$), mood ($r = 0.222$, $p = 0.033$), walking ability ($r = 0.333$, $p = 0.001$), work ($r = 0.547$, $p = 0.001$), and sleep subscales ($r = 0.288$, $p = 0.005$) were significantly positively correlated with pain intensity. However, no significant correlation was found between pain intensity and the enjoyment of life subscale ($r = 0.140$, $p = 0.184$).

Table IV: Correlation Between Pain Intensity and Pain Interference (Total and Subscales)

Variable	*r*	*p*-value
Pain Interference	0.522	<0.001
General Activity	0.553	<0.001
Mood	0.222	0.033
Walking Ability	0.333	0.001
Work	0.547	<0.001
Sleep	0.288	0.005
Enjoyment of Life	0.140	0.184

Spearman Signed-Rank; r = correlation coefficient

DISCUSSION

The major finding of this study is a significant positive correlation between pain intensity and pain interference, indicating that greater pain intensity is associated with increased interference in physical functioning. Physiologically, pain can increase sympathetic nervous system activity by releasing inflammatory mediators, which can influence physical functioning [10]. Pain can stimulate physical fatigue, sleeplessness, decreased motivation, and, in certain illnesses, lead to depressive symptoms, ultimately adding to pain disturbance [11]. In line with these findings, previous research has confirmed that greater pain severity is highly associated with pain interference scores in all domains, highly correlated with interference with regular physical activities, and influences reduced social functioning [12,13].

This study found that breast cancer patients' pain intensity ranged from moderate to severe. More than half of the participants were middle-aged adults (ages 49-59). Epidemiologically, breast cancer is most common in women aged 40-60 years [14]. Furthermore, women's increased domestic responsibilities exacerbate this condition. Women are often expected to be responsible for household chores, potentially increasing pain in addition to the pain caused by chemotherapy[15].

The majority of respondents underwent chemotherapy at 21-day intervals with taxane-based chemotherapy regimens and their combinations. Taxane-based regimens are believed to be associated with the primary cause of chemotherapy-induced peripheral neuropathy (CIPN), which often triggers characteristic neuropathic pain such as throbbing and stabbing [5,16]. Consistent with the results of this study, the three main descriptions reported by participants were throbbing, aching, and stabbing.

More than half of the participants had not undergone a mastectomy, while the rest had undergone a mastectomy. Clinically, surgery history can be an etiology of post-mastectomy pain syndrome (PMPS), a chronic neuropathic pain persisting for months or years after the mastectomy [17,18]. However, in this study, more participants had not received a mastectomy compared to those who had received one, and the pain levels that were reported were moderate to severe, indicating that surgery was not the main cause of pain, but something else, one of which was chemotherapy. Despite the lack of surgical history, the effect of adjuvant therapy more often determines the intensity of systemic pain, such as chemotherapy and radiotherapy [19].

Most of the patients experienced moderate to severe pain, but more than half of them had never taken medication or were not accustomed to taking analgesic medication. This is what is termed the phenomenon of undertreated cancer pain, whereby cancer patients are often undertreated, more so in pain treatment. This is related to access, fear of side effects, and beliefs about pain being part of the disease [20,21]. Patients' decisions to use analgesics, which are associated with cultural and psychological factors, may also influence this condition. This is true even if the pain is perceived as extremely severe [22,23].

Although the participants experienced severe and moderate pain, they reported low total pain interference. Psychological resilience factors have been found to affect the impact of pain on daily functioning [24,25] here, participants who were high in resilience reported lower pain interference than individuals with low resilience. This occurred even though both of them experienced the same level of pain. However, this study did not directly measure participants' levels of psychological resilience.

Further analysis found that the work and general activity subscales were the most impactful pain interference subscales. This is closely related to the type of work the participants were predominantly homemakers whose primary activities were physical activities such as housekeeping, preparing meals, or caring for the family. In oncology patients, daily physical activity, including domestic work, is the aspect most affected by pain [26]. As previously explained, patients receiving taxane-based chemotherapy regimens often experience neuropathic pain, as evidenced by the dominant pain sensations of throbbing, aching, and stabbing, which can limit work, general activity, and walking ability. Moreover, neuropathic pain is more difficult to manage and produces greater functional impairment than nociceptive pain [27,28].

Another interesting finding is that, in this study, no significant correlation was found between pain severity and the enjoyment of life subscale. This finding indicates that patients can enjoy life despite experiencing pain. This may be due to adequate social support. In the context of Indonesian society, which is known for its collectivist culture that emphasizes togetherness, mutual support, and prioritizing shared interests, this social support helps patients enjoy their lives despite the pain they experience. It can also act as a buffer, mitigating the negative impact of pain on social relationships [29,30]. This is also what causes the relations with others subscale to be found to be completely undisturbed, even though pain is felt to be present.

Thus, the findings of this study strengthen the evidence that pain intensity is an important predictor of pain interference levels. Breast cancer patients on chemotherapy need pain to be controlled mainly by general activity, employment, and locomotion, supplemented by pharmacologic interventions of pain management and non-pharmacologic interventions such as physical therapy and psychosocial support to minimize its impact on daily activities and maximize quality of life.

Nevertheless, this study has limitations. The sample was two hospitals in Medan, Sumatera Utara, thus little representative of demographic and cultural diversity, and the generalizability of the study results was constrained.

CONCLUSION

Breast cancer patients undergoing chemotherapy experience moderate to severe pain, with throbbing and aching sensations predominating. Taxane-based chemotherapy regimens are most commonly used and have the potential to trigger chemotherapy-induced peripheral neuropathy. A significant positive relationship was found between pain intensity and pain interference, particularly with the general activity, work, and walking ability subscales. The findings of this study suggest that nurses should minimize the impact of pain on the daily activities of breast cancer patients and provide a holistic approach to pain management. Further research is needed to identify the role of other components, such as psychological resilience.

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AUTHOR CONTRIBUTION

Harahap IA: Contributed to study design, development of the theoretical framework, patient recruitment, data collection and follow-up, manuscript drafting, literature review, and overall study supervision.
Nasution A: Contributed to guiding the research design, ensuring compliance with ethical and scientific standards, assisting in statistical analysis selection, evaluating data interpretation, and revising and refining research proposals, reports, and manuscripts.
Harahap U: Contributed to providing input on the mechanisms of chemotherapy-induced pain, ensuring protocol suitability for breast cancer patients, and offering feedback on study design, methodology, and results.
Ardinata D: Contributed to validating patient inclusion criteria, advising on participant selection and ethical clearance formulation, ensuring adherence to moral and hospital standards, and providing input on data interpretation.

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