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Effectiveness of care bundle approach on neuropathic pain and knowledge on home safety measures.

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Abstract

The experience of pain in cancer is widely accepted as a major threat to the quality of life, and the relief of pain has emerged as a priority in oncology care. The study aimed to analyze the effectiveness of the care bundle approach on neuropathic pain and the knowledge of home safety measures using chemotherapy-induced peripheral neuropathy. A true experimental repeated measure design was used for this study. One hundred and twenty cancer patients receiving cancer chemotherapy were selected in this study. In the present study, health teaching was given on home safety measures by handout presentation among patients receiving chemotherapy drugs. The neuropathic pain in the pre-test and post-test in control and experimental groups were analyzed by the Mann-Whitney rank sum test. It is the responsibility of the oncology nurse to develop a plan of care to manage the symptoms of Chemotherapy-induced peripheral neuropathy, keep the patient safe, and allow them to continue cancer treatment.
Keywords: Care bundle; cancer; chemotherapy; neuropathic pain.

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1. Introduction

Chemotherapy-induced peripheral neuropathy (CIPN) is a significant, debilitating symptom directly related to the administration of neurotoxic chemotherapy for the treatment of cancer. CIPN compromises the quality of life and results in pain or discomfort [1]. Peripheral neuropathy is the result of peripheral, motor, sensory, and autonomic neuron damage secondary to neurotoxic chemotherapy agents that inactivate the components required to maintain the metabolic needs of the axon [2]. Given the lack of standardized measurement and reporting mechanisms, the incidence of CIPN is relatively unknown. However, the incidence of severe CIPN has been estimated at 3%–7% in people treated with single agents, and upwards of 38% in those treated with multiple chemotherapeutic agents [1].

The chemotherapeutic agents most often associated with CIPN are platinum compounds, taxanes, vinca alkaloids, thalidomide, and bortezomib. CIPN is a concern for patients and clinicians, as manifestations of neurotoxicity can result in chemotherapy dose reductions, treatment delays, or discontinuation of treatment. Although no standard therapy exists for the prevention or treatment of CIPN, nursing care can improve associated symptoms. A lack of consensus regarding assessment measurements and subsequent grading of CIPN makes comparisons among studies of CIPN difficult [3].

The experience of pain in cancer is widely accepted as a major threat to the quality of life, and the relief of pain has emerged as a priority in oncology care [4,5]. Pain is associated with both the disease as well as treatment, and management is essential from the onset of early disease through long-term survivorship or end-of-life care [6,7]. Effective relief of pain is contingent upon a comprehensive assessment to identify physical, psychological, social, and spiritual aspects and as a foundation for multidisciplinary interventions. Fortunately, advances in pain treatment and the field of palliative care have provided effective treatments encompassing pharmacological, cognitive-behavioral, and other approaches [8,9] . The field of palliative care has emphasized that attention to symptoms such as pain is integral to quality cancercare.

1.1. Purpose of study

The study aimed to analyze the effectiveness of the care bundle approach on neuropathic pain and the knowledge of home safety measures using chemotherapy-induced peripheral neuropathy.

2. Materials and methods

2.1. Participants

A true experimental –-repeated measure design was used for this study. One hundred and twenty cancer patients receiving cancer chemotherapy were selected in this study. Permission was obtained from the authorities of the hospital to carry out the study. The patients were randomly assigned to control and experimental group. Patients receiving chemotherapeutic agents which cause neurotoxic effects like taxanes (paclitaxel, docetaxel), the vinca alkaloids (vinorelbine), the platinum analogs (cisplatin, carboplatin), and the antimetabolites (capecitabine) with grade I, II, III were selected. Patients who are not able to perform basic activities of daily living such as walking and Patients with co-morbid diseases that might hamper physical exercise (e.g., heart failure, chronic obstructive pulmonary disease (COPD), orthopedic conditions, and neurological disorders like Cerebrovascular accident and diabetes mellitus were excluded.

2.2. Ethics

This study was approved by the institutional Human Ethics Committee of Saveetha University (2017/IEC/SU; Dated 11 August 2017).

2.3. Data collection

The study used an Experiment. The recruitment process involved the introduction of the

patient to the researcher by an oncology physician. Initially, 130 patients were recruited for the study from the oncology patient chemo Database registry excluding unwilling patients. An assessment meeting was scheduled in the hospital after the criteria were met and the patient agreed to participate. After all questions were answered regarding the study protocol, the subjects agreed to participate in the study. The subjects were then asked to sign an informed consent form before the beginning of the administration of the assessments. The patients were allotted to the respective experimental and control groups by random allocation method. However, 10 patients dropped out of the study during the 12-week training program. Reasons for ceasing participation included 4 patients referred to another hospital, four patients died and two were noncompliant with the treatment. Thus, a total of 120 patients completed the 12-week home-based exercise program. On the day of admission, the demographic profiles of all participants were obtained by the structural questionnaire. Screening procedures such as echo, ECG, and blood investigations, according to the hospital protocol were done before the administration of chemotherapy, and cardio-respiratory, Physical fitness was assessed by VO2 max and flexibility test, level of cipn by NC CTCAEV scale, QOL by EOQRTC scale, and knowledge regarding home safety measures by structured questionnaire i.e., pretest 1st week of the first month. During the administration of chemotherapy, the emerging signs of CIPN were observed. The procedure of the intervention of each group was explained. For the control group the qol, cipn was assessed without the intervention. After providing the respective intervention for three days i.e., alternative days the post-test was carried out at the end of 3rd week of the first month, 7th week of the second month, and the 11th week of 3rd month. The patients expressed that they felt relaxed after the intervention in the experimental group.

2.4. Data analysis

The neuropathic pain in the pre-test and post-test in control and experimental groups were analyzed by the Mann-Whitney rank sum test. Friedman repeated measures analysis of variance on ranks was used for the comparison of medians of pretest and post 1 to posttest 3 of control and experimental groups. A probability of 0.05 or less was taken as statistically significant. The analysis and plotting of graphs were carried out using sigma plot 12 (Systat Software Inc., USA).

3. Results

3.1. Neuropathic Pain

Fig 1 shows the box plot of neuropathic pain in the control and Experimental group. The box plot shows the mean, median, 25 percentile, 75 percentile, minimum value, maximum value, and the outliers of the score. Since the data is ranked data and also a discrete variable parametric statistic, (Mann-Whitney one-way analysis of variance on ranks test was used; H- value is reported) were used. The median of control pretest and posttest 1, posttest 2, and posttest 3 were 17.5, 16.5,12,11 respectively. The pretest and posttest 1, posttest 2, and posttest 3 had 25 percentile values of control score 10,8,8,4 respectively, whereas 75 percentile values of all the parameters were 19.75,20,20,23 respectively. There was a statistically significant difference observed in the control group at ($p=<0.001$).

The median of Experimental pretest and posttest 1, posttest 2, and posttest 3 were 16,12,8.5,7 respectively. The pretest and posttest 1, posttest 2, and posttest 3 had 25 percentile values of control score 11,6.25,5,4 respectively, whereas 75 percentile values of all the parameters were 20,18,13.75,13 respectively. There was a statistically significant difference observed in the Experimental group at ($p<0.001$).

Fig 1 configures the control and experimental pretest scores by comparison using the Friedman Repeated Measures analysis of variance on ranks, the chi-square value is reported. There was not a statistical difference among the group's pretest scores($\chi 2=3574$; $p=0.768$). The control posttest 1 neuropathic score was significantly different from the experimental posttest 1 score

(χ2=4093; p=0.015). Similarly, the control posttest 2, Neuropathic pain score was significantly different from the experimental posttest 2 CONscore (χ2=4247; p=0.001), The experimental posttest 3 neuropathic pain score showed no significant difference from the control posttest 3 score (χ2=3956; p=<0.087).

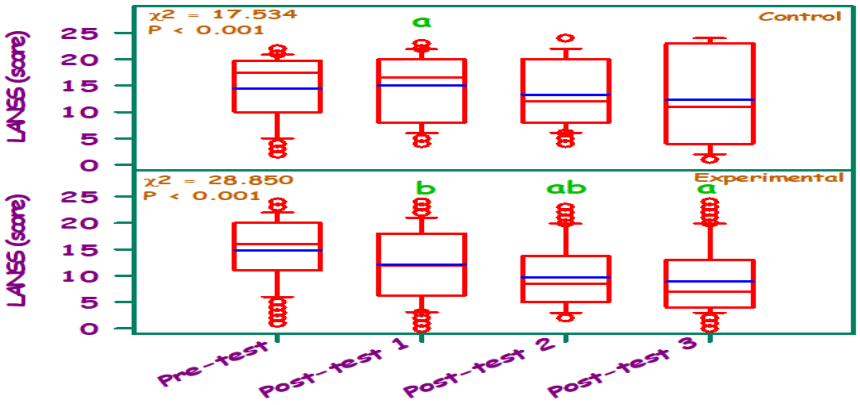

Fig. 1 Effectiveness of care bundle approach on CIPN-Neuropathic pain,of control and experimental groups.

The middle red line is the median and the blue line is the mean (n = 60 each). The χ2 and P values are by Friedman RM ANOVA of the respective groups.The control and experimental groups are compared by the Mann-Whitney rank sum test.

For the Pre-test the 'T' and 'P' values are 3574 and 0.768 respectively; For the Post-test 1 the 'T' and 'P' values are 4093 and 0.015 respectively; For thePost-test 2 the 'T' and 'P' values are 4247 and <0.001 respectively; For the Post-test 3 the 'T' and 'P' values are 3956 and <0.087 respectively.

a – Significantly different from the respective Pre-test.
b – Significantly different from the respective control group.

3.2. Knowledge score

Fig 2 shows the box plot of the knowledge score in the control and experimental group. The box plot shows the mean, median, 25 percentile, 75 percentile, minimum value, maximum value, and the outliers of the score. Since the data is ranked data and also a discrete variable parametric statistic, (Mann-Whitney one-way analysis of variance on ranks test was used; H- value is reported) were used. The median of the control pretest and post-test 1, post-test 2, and post-test 3 were 50.5,53,55,53.5 respectively. The pretest and posttest 1, posttest 2, posttest 3, 25 percentile values of control score 29.25,30,33.5,40 respectively, whereas 75 percentile values of all the parameters were 73,72.75,74,76 respectively. There was a statistically significant difference observed in the control group. at (p=<0.544).

The median of experimental pretest and posttest 1, posttest 2, and posttest 3 were 45.5,58.5,63,73 respectively. The pretest and posttest 1, posttest 2, posttest 3, 25 percentile values of control score 28.5,27.75,48.25,55.5 respectively, whereas 75 percentile values of all the parameters were 62,72,78,81.75 respectively. There was a statistically significant difference observed in the Experimental group at (p<0.002).

Fig 2 configures the control and experimental pretest scores by comparison using the Friedman Repeated Measures analysis of variance on ranks, the chi-square value is reported. There was no statistical difference among the group's pretest scores (χ2=3817; p=0. 327). The control post-test 1 knowledge score was not significantly different from the experimental post-test 1 score (χ2=3575; p=0.775), Similarly the control post-test 2, knowledge score was also not significantly different from the experimental post-test 2 knowledge score (χ2=3339; p=0.127). The

experimental posttest 3 knowledge score showed a statistically significant difference from the control posttest 3 score (χ2=3075; p=<0.004).

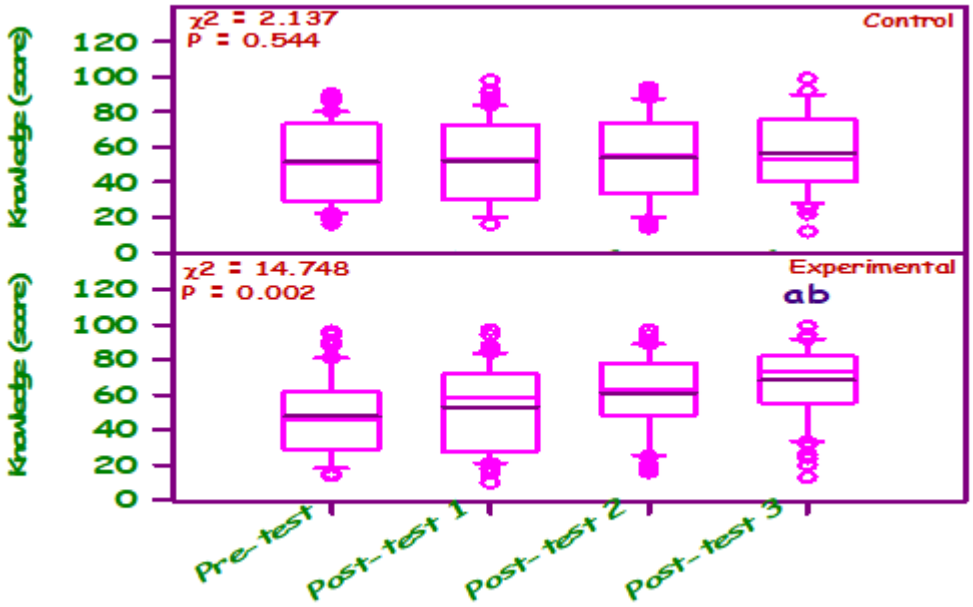

Fig. 2 Effectiveness of care bundle approach on knowledge of home safety measures of control and experimental groups.

The middle pink line is the median and the blue line is the mean (n = 60 each).

The χ2 and P values are by Friedman RM ANOVA of the respective groups.

The control and experimental groups are compared by the Mann-Whitney rank sum test.

For the Pre-test the 'T' and 'P' values are 3817 and 0.327 respectively; For the Post-test 1 the 'T' and 'P' values are 3575 and 0.775 respectively; For the Post-test 2 the 'T' and 'P' values are 3339 and 0.127 respectively; For the Post-test 3 the 'T' and 'P' values are 3075 and 0.004 respectively.

a – Significantly different from the respective Pre-test.
b – Significantly different from the respective control group.

4. Discussion

4.1. Neuropathic Pain

Chemotherapy-induced peripheral neuropathy (CIPN) is a significant, debilitating symptom directly related to the administration of neurotoxic chemotherapy. CIPN results from damage to or dysfunction of the peripheral nerves that connect the brain and spinal cord with the rest of the body. These nerves include the motor, sensory, and autonomic nerves. CIPN compromises the quality of life and results in pain and discomfort. The above study finding is consistent with the present study reportof Neuropathic pain among patients receiving cancer chemotherapy.

The great majority of 1,638,910 patients (75–90 %) with a diagnosis of cancer experienced cancer-related pain. A growing number of these patients will turn to complementary and alternative therapies to assist with the management of their pain and other cancer-related symptoms. A detailed analysis was done in the present study in assessing the Neuropathic pain. The standardized LANSS neuropathic pain scale was used to assess the pain among the patients receiving cancer chemotherapy. The pretest total neuropathic score was not statistically significant. The experimental group's posttest 1, posttest 2, and posttest 3 scores were significantly different from the control

group.

Massage therapy has been reported in studies to help relieve pain (not specifically CIPN pain. It is believed that massage may facilitate the healing of nerves by improving blood circulation to the affected tissues (increasing oxygen and nutrient flow). Massage also increases the production of natural pain-killing proteins (called, endorphins) in the tissues being massaged. Exercise programs that include strength and balance training may increase physical performance, increase independence, and have positive effects on role function or other elements of health-related quality of life. In the present study, exercises and massage therapy were given for the cancer patients receiving chemotherapeutic drugs in the experimental group for three days (60 minutes/day) in a week, massage therapy was given for the hand and foot for 30 minutes in the evening. The neuropathic pain scores of the experimental group were highly significant from the control group. The improvement in the experimental group was better than the control group. The control posttest 2, Neuropathic pain score was significantly different from the experimental posttest 2 CON score ($\chi 2=4247$; $p=0.001$), The experimental posttest 3 neuropathic pain score showed no significant difference from the control posttest 3 score ($\chi 2=3956$; $p=<0.087$) which showed that there was a significant reduction in Neuropathic pain within the Experimental group, but not between the groups.

Neuropathic pain following SCI is often only partially responsive to most interventions. Results from this study indicated that both acupuncture and massage therapy relieve SCI neuropathic pain . This study is similar to the present study findings. Although foot bathing and foot massage are both supportive care techniques for CIPN patients, foot bathing was more effective than foot massage on skin temperature, grade of neurotoxicity, and quality of life [10]. The experience of pain in cancer is widely accepted as a major threat to the quality of life, and the relief of pain has emerged as a priority in oncology care. The field of palliative care has emphasized that attention to symptoms such as pain is integral to quality cancer care.

4.2. Knowledge score

Peripheral neuropathies are a common side effect of certain types of chemotherapy drugs, including taxanes, platinum-based drugs, vinca alkaloids, and thalidomide. Neuropathies may last for months or years following treatment and can impact functional performance and quality of life. The explorative study on the effects of chemotherapy-induced peripheral neuropathy (CIPN) and neuropathic pain on the lives of patients with cancer emphasized the importance of ongoing assessment and communication with patients about their experiences with peripheral neuropathies. Knowledge of what patients with CIPN experience will guide nurses in suggesting interventions to promote safety and help alleviate symptoms [11]. Similarly, the patients in the present study also reported a lack of knowledge regarding home safety measures.

A detailed analysis was done in the present study to assess the knowledge score. The structured questionnaire was used to assess the knowledge among the patients receiving cancer chemotherapy. The pretest knowledge score was not statistically significant. The experimental group's posttest 1, posttest 2, and posttest 3 scores were significantly different from the control group

The Patients need to be educated on what to expect with CIPN. Beyond pharmacologic treatments, it may also be helpful to discuss nonpharmacologic supportive care strategies to cope with CIPN, such as personal safety measures to prevent burns or falls that may be related to sensory-motor deficits. Functional deficits, such as decreased balance, gait abnormalities, and muscle weakness, can occur with CIPN [12]. The literature regarding patient teaching on home safety measures is scant. Studies were done on other aspects of effectiveness, such as STP on BSE among breast cancer patients. Additional studies are required to confirm the effectiveness of Health teaching among CIPN patients.

5. Conclusion

In the present study, health teaching was given on home safety measures by handout presentation among patients receiving chemotherapy drugs. The knowledge scores of the experimental group were highly significant from the control group. The improvement in the experimental group was better than the control group. The experimental posttest 3 knowledge score showed a statistically significant difference from the control posttest 3 score (χ2=3075; p=<0.004). which showed that there was a significant improvement in the knowledge regarding home safety measures among patients receiving cancer chemotherapy. The neuropathic pain scores of the experimental group were highly significant from the control group. The improvement in the experimental group was better than the control group. The control posttest 2, Neuropathic pain score was significantly different from the experimental posttest 2 CON score (χ2=4247; p=0.001). The experimental posttest 3 neuropathic pain score showed no significant difference from the control posttest 3 score (χ2=3956; p=<0.087) which showed that there was a significant reduction in Neuropathic pain within the Experimental group, but not between the groups.

Patients should also be provided with advice for detecting and managing chemotherapy-induced peripheral neuropathy and advised on how to avoid harmful situations if they lose sensation in their extremities and how to compensate for such losses to maintain their safety. The successful treatment of patients with CIPN includes managing pain, preventing the progression of this side effect, and assuring patient safety while treating the cancer with optimal chemotherapy doses. It is the responsibility of the oncology nurse to develop a plan of care to manage the symptoms of CIPN, keep the patient safe, and allow them to continue cancer treatment.

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