

Effect of Implementing Bundle of Care on Breast Cancer Patients Paclitaxel Induced Peripheral Neuropathy and Quality of Life

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Abstract:

Background: Breast cancer is the most often diagnosed disease and the main cause of death between females globally. Different chemotherapeutic are used, such as doxorubicin or epirubicin in combination with cyclophosphamide, and paclitaxel (Taxol) or docetaxel in combination with carboplatin **Aims:** the study aimed to evaluate effect of implementing bundle of care on breast cancer patients paclitaxel induced peripheral neuropathy and quality of life. **Methods:** Research Design: A quasi-experimental research design was used to conduct the study. Subjects: A purposive sample of 60 adult subjects newly diagnosed with breast cancer and treated with paclitaxel. **Setting:** This study was conduct at oncology treatment center and nuclear medicine department at Qena university hospital. **Data collection Tools:** Four tools were used for data collection: Tool I: Breast cancer patient's structured interview questionnaire. Tool II: The Chemotherapy Induced Peripheral Neuropathy Assessment (CIPNA). Tool III: Functional Breast (FACT-Tool IV. Neuropathy Grading Assessment Scale. **Results:** The mean Assessment of Cancer Therapy – scores of PIPN -QOL for the study group increased one and two months after bundle of care implementation compared to upon admission in the study with highly statistically significant differences between them at $p < 0.001$. Statistically significant differences regarding sensory and motor neuropathy grading (G1, G2, G3, and G4) was found after one and after two months of implementing bundle of care instructions between both group $p \leq 0.05$. **Conclusion:** Implementing bundle of care has a positive effect on PIPN-QOL. The study group demonstrates a statistically significant

improvement regarding sensory/motor neuropathy grading and quality of life.

Recommendations: The bundle of care instructions should serve as the basis for routine nursing care for patients receiving paclitaxel to improve their peripheral neuropathy and quality of life.

Keywords: Bundle of Care, Breast cancer, Paclitaxel -Induced Peripheral Neuropathy, and Quality of life

Introduction

Breast cancer (BC) is the more often diagnosed disease and main cause of mortality among females globally, expected 2.3 million new cancer cases (1 in 4) and 685,000 cancer deaths (1 in 6 deaths) in 2020 (Sedeta et al.,2023).

It considers the most common cancer in Egyptian females. Generally, patients present at a late stage with prosecute poor prognosis. It constitutes 33% of female cancer cases and more than 22,000 new cases diagnosed each year (Ibrahim et al.,2022). BC, often treated with combination of surgery, radiation therapy, systemic therapies like chemotherapy, and hormone therapy. Clinical and pathological factors may influence the prognosis and treatment choices based on conventional histology and immune-histochemistry (American Cancer Society, 2024).

Breast cancer systemic treatment include endocrine therapy for hormone receptor-positive cancer, chemotherapy, anti-HER2 therapy for HER2-positive disease, bone stabilizing drugs, poly (ADP-ribose) polymerase inhibitors for BRCA mutation carriers, and, most recently, immunotherapy (Harbeck et al.,2020). Chemotherapy is used to destroy cancer cells, by keeping the cancer cells from growing, or dividing. There are many types of chemotherapy used

to treat breast cancer. The European Society for Medical Oncology (ESMO) and American Society for Clinical Oncology (ASCO) recommend the (neo) adjuvant chemotherapeutic medicines in almost all instances. Different regimens are used, such as doxorubicin or epirubicin in combination with cyclophosphamide, and paclitaxel (Taxol) or docetaxel in combination with carboplatin (Gennari et al., 2021; Korde et al., 2021).

Taxol is a taxane chemotherapeutic medication. It is used to treat both early-stage and metastatic breast cancer. Docetaxel (taxotere) and abraxane are two other taxanes used to treat breast cancer. Nevertheless, patients may experience abundant side effects, including myelosuppression, myalgia, arthralgia, hypersensitivity reactions, added to chemotherapy-induced peripheral neuropathy (CIPN) (Abu Samaan et al., 2020).

Paclitaxel stimulates microtubule assembly, which causes neurotoxicity. Paclitaxel has been shown in clinical trials to cause peripheral neuropathy, which is depending on the amount delivered, the duration of the infusion, and the delivery schedule. Paclitaxel was found to accumulate in the dorsal root ganglia and enter the brain, albeit at extremely low amounts Paclitaxel-related CIPN is a predominantly sensory axonal neuropathy, typified by

sensory modulation such paresthesia, numbness, tingling, burning sensation, and peripheral neuropathic pain. Additionally, motor weakness, and autonomic dysfunction. CIPN may basically lead to debilitating limitations in the routine daily living activities (Lixian et al., 2024).

With the progression of CIPN, patients usually have problems in balance, concerns repeated falls, and experience limitations of mobility, activities, familial and social roles, also sleep disturbances, fatigue, show limited work performance leading to gradual deterioration in health-related quality of life (QOL) (Salehifar et al.,2020).

Nurses has an important role is managing paclitaxel-related CIPN as should focus on assessment the patient potential side effects of paclitaxel.

Providing specific educational nursing instructions regarding symptoms that need to be reported, educate the patient complementary and integrative guidelines that improving quality of life and help in minimizing patient suffering chemotherapy complications. Nurses must be aware about complementary therapies such as relaxation or deep breathing exercises teaching patients safe exercise tips for peripheral neuropathy that improve blood and nutrient flow to the legs and feet, reduce swelling, strengthen and stabilize weakened muscles and supporting tissues also progressing to a more severe stage may be helpful also teach the patient coping and methods of relive fatigue that affect the way of think and feel leading to depression anxious or stress and affects the quality of sleep (Abdollahi et al.,2020).

Operational Definition:

Bundle of Care: In the scope of this study; Bundle of care means supportive care instructions that often composed of, specific massage includes (structured palpation of the soft tissues, stroking, kneading, gliding, percussion, friction, vibration, compression, petrissage acupressure and compared cryotherapy. These techniques applied with human hands. Also nutritional changes include (eat a healthy diet rich in fruits, vegetables, whole grains and lean protein to provide sufficient vitamin (B12). In addition to relaxation techniques, emotional and spiritual support depending on passive and active assisted exercises like range of motion exercise, QIgong, and mind fullness. Patient who receive supportive care along with treatment for the cancer often have less severe symptoms, better quality of life, and report more satisfied with treatment.

Peripheral neuropathy: In this study; peripheral neuropathy refers to symptoms caused by anticancer drugs that damage motor, sensory, and autonomic nervous systems due to administration of paclitaxel. It causes symptoms as Pain like pins prick, sting or needle stick, burning, as well as numbness in hands and feet which may lead to problem with balance and walking. **Significance of the study:**

Patients with breast cancer commonly need complementary and integrative therapies as supportive care during treatment and managing treatment-related side effects. (Korde et al., 2021). Breast cancer is the common cancer within Egyptian females. Most patients have poor results because they

present late. It accounts for 33% of cancer cases in women and around 22,000 newly diagnosed cases annually. (Ibrahim et al., 2022).

According to oncology treatment center Qena university hospital record, 300 patient admitted for receiving Paclitaxel in last year from January 2022 to January 2023 (Qena University hospital record, 2022). In view of the fact that, evidence supporting the use of such therapies in the oncology setting is limited. Also medication is not recommended to prevent chemotherapy induced peripheral neuropathy due to a possibility of harm (Seretny et al., 2022). These complications enhance the financial problems for both the hospital and the patient, produce additional demands on the time and resources of the medical and nursing staff. Thus, breast cancer patients treated with Paclitaxel need some measures to improve peripheral neuropathy and quality of life by educating the patient ROM exercise, mind - body therapy and complementary therapy.

Aim of the study:

Evaluate the effect of implementing bundle of care on breast cancer patients paclitaxel induced peripheral neuropathy and quality of life

Research hypothesis:

H 1: Total mean Peripheral neuropathy score will be reduced among study group undergoing paclitaxel treatment than control group.

H2: Total mean quality of life score will be improved among study group undergoing Paclitaxel treatment than control group.

Methods:

Research Design:

A quasi-experimental research design was used. This type of studies includes working with independent variables random assignment of participants terms (Khorais et al., 2022). The bundle of care considered the independent variables while the dependent variable was: peripheral neuropathy and quality of life.

Research setting:

This study was conduct at oncology treatment center and nuclear medicine department at Qena university hospital. The building attached to the university hospital in Qena, consisting of two floors. The first consists of outpatient clinics in which oncology patients are followed up, as well as a planning and radiation treatment unit, also a meeting room in which patients receive instructions and education. It accommodates 30 people, has a data show projector and conforms to safety and health specifications. The second floor consists of three operating rooms for oncology surgery, in addition to 25 beds as inpatients after surgeries and receiving chemotherapy doses. This center was established in 2006.

Sampling and sample size:

A purposeful sample of (60) adult subjects newly diagnosed breast cancer patient without history of breast cancer recurrence and treated by paclitaxel were selected according to inclusion criteria: Patient's age from $18 \leq 60$ years, stage II & III breast cancer, conscious and alert, started paclitaxel complaining of (PIP) on toes, soles, heels or dorsum of the feet not receiving any intervention protocol, and

free from any chronic diseases as diabetes, congestive heart failure, end stage renal disease and liver failure. They were divided into two equal groups (study and control), 30 patients for each. The study group received bundle of care and routine hospital care such as vital signs, paracetamol tablets 500mg and receiving the chemotherapy as per doctor order while the control group received the routine hospital care only.

Exclusion criteria:

Patient with previous diseases causing peripheral neuropathy autoimmune and inflammatory diseases as Gillian barre syndrome, rheumatoid arthritis, systemic lupus also infections, inherited disorders , bone marrow disorders as amyloidosis and an underactive thyroid (hypothyroidism)as well as alcoholic patients and vitamin b deficiency patient .

Sample size:

The sample size was calculated using G power software version 3.1.9.7 based on an expert opinion by Cohen effect size 0.5. The minimum sample size was 26 patients for each group with power (1- β err prob) 0.8 and (α err prob) 0.05. The researchers had obtained 60 patients due to low-response rate that expected to be lost from the patients.

Data collection Tools: four instruments were used for data collection as follow:

Tool I: interviewing questionnaire:

Part (1): Patients' socio-demographic data: it includes age, marital status, residence, education level, and occupation.

Part (2): Medical history: added to number of chemotherapy cycles

received (started neuropathy symptoms, patient intolerant to symptoms of CIPN, patients decide to stop continuation of paclitaxel due to CIPN).

Tool II: The Chemotherapy Induced Peripheral Neuropathy Assessment (CIPNA): Adopted from Tofthagen (2023) and consists of two parts:

Part one: The symptom severity experience items, measure nine neuropathic symptoms as: numbness in the hands, numbness in the feet, tingling in the hands, tingling in the feet, sensitivity to cold temperatures, nerve pain, muscle/joint aches, muscle weakness, and loss of balance.

Scoring system: For each symptom reported, patients were asked to rate the intensity, distress, and frequency of that symptom on a 0 to 10 numeric rating scale. Higher scores on the symptom experience scale correspond with higher degrees of CIPN. Scores on the symptom experience items range from 0 to 279, with higher scores indicating more neuropathy as the following: (35- \geq 70) graded as grade one neuropathy (G1), (> 70- \geq 140) graded as grad two neuropathy (G2), (> 140- \geq 210) graded as grad three neuropathy (G3) and (> 120- \geq 279) graded as grad four neuropathy (G4).

Part two: The 14 interference to activity of daily living items, ask participants to rate, on a scale of 0 (not at all interfering) to 10 (completely interfering), how much their symptoms interfere with their ability to perform specific daily activities as : Dressing, walking, picking up objects, holding onto objects, driving, working, participating in hobbies or leisure activities, exercising, engaging in

sexual activity, sleeping, having relationships with others, writing, doing household chores, and enjoying life.

Scoring system: Higher scores on the interference scale correspond with greater neuropathic interference with usual activities (poorer functional status). Scores on the interference items range from 0 to 140, with higher scores indicating more significant neuropathic interference with usual activities. It divided as 0-14 = not at all interference, > 14 - 42 = mild interference, > 42 - 84 = moderate interference and > 84- 140 = severe interference.

Tool III: Functional Assessment of Cancer Therapy – Breast (FACT-B)

The Functional Assessment of Cancer Therapy for breast cancer (FACT-B) adopted from Chang et al., (2019). It was used to assess general QoL in patients with breast cancer. **Scoring system:** The 27 item FACT-B contains 4 domains: physical well-being (PWB) (7 items), social/family well-being (SWB) (7 items), emotional well-being (EWB) (6 items), and functional well-being (FWB) (7 items). Each item is scored on a scale of 0 to 4.

The total score 0-148 with 0-49 low quality of life.

50-99 moderate quality of life

100- more than 140 high level and better QoL.

Tool IV. Neuropathy Grading Assessment Scale

Neuropathy grading scale that developed by Cornblath et al., (2020). It will be adopted by the researchers and translated into Arabic by the researchers is used to the assessment of sensory and

motor neuropathy grads (G1, G2, G3 and G4).

Scoring system:

according to the WHO rating scale, a grade 0 corresponds to no symptoms of neuropathy, grade 1 corresponds to paresthesias (a tingling, tickling or prickling sensation) and/or decreased tendon reflexes, grade 2 corresponds to severe paresthesias and/or mild weakness, grade 3 corresponds to intolerable paresthesias and or marked weakness/ Stage 4 Complete Numbness/ Loss of Sensation.

Validity and reliability:

After the researcher created the instruments, the part-validation of the instruments was reviewed by a group of by 7 experts (5 academic medical surgical nursing staff and two Oncologist) at Qena University. The experts reviewed the content validity of the instruments, making changes according to their recommendations on clarity, adequacy, and completeness. All instruments reliability was tested using test re-test method to ensure their consistency. The reliability of instrument (I&II) cronbach's alpha was 0.87. The test re-test correlation coefficient was 0.79. While for the (III) the Cronbach's α was 0.88. Moreover the reliability of the instrument (IV) was Cronbach's α =0.82

Bundle of care instructions:

It was designed by the researcher depending on literature reviews (Markman, 2022, Moulin et al., 2022 & Nguyen & Lawrence ,2023). These instructions aimed to provide supportive nursing care regarding breast cancer patients paclitaxel treatment to improve their physical

condition, ameliorate neuropathic pain, minimize disability, preserve function, improve quality of live and increase the patient adheres to continuing of chemotherapy. By engaging in lifestyle counselling, mind- body therapy and complementary therapy.

It prepared in a simple Arabic language and illustrated photos. It also includes (introduction, definition of paclitaxel induced peripheral neuropathy, indications, contraindications, complications, advantage, disadvantage, pain management, nutrition, exercises and walking.

Pilot Study:

It was conducted on 10% of participants (6 patients) who met the selection criteria to assess the effectiveness, the applicability and clarity of the tools, estimate the time needed for data collection, and test the feasibility of conducting the study. The data obtained from the pilot study were analyzed; No modification for data collection instrument, so the 10% of subjects were included. The pilot study found that the average time needed to complete the tools (45 min)

Ethical considerations:

The research proposal was approved by the Ethical Committee in the Faculty of Nursing, South Valley University (SUV/NUR/ned/sur/11/66.

Date:2/1/2023).Official approvals were obtained from oncology treatment center and nuclear medicine department at Qena University Hospital. The study adhered to accepted ethical standards for clinical research. Patients who participated in the study were given the opportunity to give their consent after being informed

of its scope and objectives. The study causes no harm to patient and so the code number was use used instead of patient name. The anonymity and confidentiality were guaranteed. Each participant had the right to decline participation or withdraw from it at any time.

Data collection procedure:

Data collection took a period of 6 months, between February 2023 till July 2023., and the study was divided into 4 phases.

Phase I- Preparatory phase:

During this period; the hospital's administrator, nursing supervisors, and oncology treatment center and nuclear medicine department received formal approval. It also includes a recent review of relevant literature to collect necessary data for study following a review of literature; the study materials and supportive nursing guidelines were developed.

Phase II- Assessment phase:

Once the study was approved to conduct the intended research, a patient's interview was conducted to discuss the goal and nature of the study also A psychological preparation which was carried out by explaining the purpose and effects of bundle of care instructions. Ethical considerations were taken to ensure privacy and confidentiality of the participants. Participation was completely voluntary.

Phase III: Implementation phase

- The researcher went to the oncology treatment center and nuclear medicine department, made a random assignment of patient to study and control. During the first week from the study, the

patient was assigned to the study group, and the patient during the second week was assigned to the control group, which was repeated for all weeks.

- After discussing their rights and the study's nature and goal with each patient individually, the researchers obtained their written consent to participate in the study.

For the study group:

After the patient completes the patients' socio-demographic data and the study tools, the researchers go through the implementation of bundle of care.

- The meeting was done in the morning and afternoon shifts.

- Five sessions were conducted with study participants.

- Each session lasted between 30 and 45 minutes including 10 minutes for discussion and feedback.

- At the first session (theoretical):

The researchers introduce themselves, establish a line of communication, and conduct an initial assessment; simple information was included (definition of Paclitaxel -Induced Peripheral Neuropathy, indications of paclitaxel treatment, contraindications, complications, advantage, disadvantage of it). This meeting lasted between 30 and 45 minutes.

At the second session (theoretical):

the researchers explain to the patient, pain management, herbal medicine and This meeting lasted between 35 and 45 minutes .

- At the third session (theoretical):

the researchers explain to the patient, nutrition support. Indications for continuation Paclitaxel treatment

cycles were discussed.

At the fourth sessions (practical):

exercise training was demonstrated by the researcher to the patient, lasted for two consecutive days. Based muscle strengthening and balancing exercise program four times a week as 20 minutes on average each as: Resistance strength turning: The patient was fully independent, the nursing guidelines focused on passive and active assisted exercises.

pro-prioceptive neuromuscular facilitation (PNF) like range of motion exercise (10 minutes), included whole-body exercise training (10 repetitions for each joint) such as bridging, and core stability exercise, calf stretch, plantar flexion stretch, straight leg raise, knee flexion and extension added to walking support. If possible, the patient should be mobilized in a sitting position or with the head raised; this position is more favorable to ventilation.

- At the fifth session (practical session):

the researcher demonstrates mind - body therapy: composed of QIgong, mind fullness, music and art therapy at the time of Complementary therapy administered which composed of:

- Reflexology as hand and leg acupressure for 10 minutes

- cryotherapy session with the use of freezing gloves and socks reduced the likelihood of PIPN by inhibits the release of vasodilation chemicals, hence decreasing the sensitivity of pain receptors, but it also decreases muscle spasms by decreasing nerve conduction velocity muscle excitability , reduce regional perfusion metabolic rate, and

cell chemical activity in order to alleviate chemotherapy-related symptoms

Polyacrylic polyol polymer is used inside the gloves and socks as a refrigerant for freezing. To get the optimal ideal temperature, the researcher places the gloves in a -20°C freezer for at least 3 h before usage. The subjects wore freezing gloves and socks from 15 min prior to Paclitaxel infusion to 15 min after its infusion and continued to wear the device during treatment. Paclitaxel is typically administered within 30 min; therefore, cryotherapy typically lasts 60 min. Gloves and socks can be kept at a temperature of between (-10 to 4°C) when in use. the cryostat was substituted to uphold every 30 min (optimal vasoconstrictive cryogenic) temperatures. Furthermore, as a measure of hygiene, the participants utilized disposable nitrile gloves and polypropylene sock liners within their gloves and socks, correspondingly. Participants with cryotherapy intolerance were permitted a brief pause (5 min) during cryotherapy administration.

- Massage therapy is structured palpation or movements of the soft tissues of the body. It include, stroking, kneading, gliding, percussion, friction, vibration, compression, effleurage (either firm or light soothing, stroking movement, without dragging the skin, using either padded parts of fingertips or palms); petrissage (lifting or picking up muscles and rolling the folds of skin); or tapotement (striking with the side of the hand, usually with partly flexed fingers,

rhythmic movements with fingers or short rapid movements of sides of the hand). These techniques may be applied with or without the aid of lubricants for 15 min. The purpose of the practice of massage is to enhance the general health and well-being of the patient.

- Arabic illustrated copies of bundle of care instructions were provided for every patient within the study group.

- For control group:

They receive routine hospital care (Paracetamol tablet 500 mg three times a day) and after data collection, copies of the supportive nursing guidelines were provided for every patient. Phase IV: Evaluation phase: Patients from the study and control group were seen (2 times a week) for two months using tool II, III and IV to examine the effect of bundle of care instructions. The time and place for follow up were arranged within the meeting room of oncology center at Qena University Hospital for reevaluation. -Comparison was done between two groups in order to measure the effect of the bundle of care instructions on peripheral neuropathy progression and quality of life.

Analytical statistics:

It was done by using the computer program SPSS" version. 22 ". The result presented as mean \pm , standard deviation or number and percentage and T-test used to significance for the numerical variables. The chi square test for association was used to determine if there was a relationship between two categorical variables. A correlation coefficient Pearson correlation is a numerical measure of some type of correlation, meaning a statistical relationship between two variables.

The level of statistical significance was set at $P < 0.05$.

Results

Table (1): Shows that the age of the control and study groups ranged between 30 and 40 years old (45.7%, 50 %) respectively. Concerning to marital status above two third of the both groups were married (73.3%, 76.6%), and above half of the both groups were urban (66.7%, 60%), regarding to level of education, the control group shows above half (53.3 %) were high education compared with less than half in the study group (46.6%). Employee patients represented (40%, 50%) respectively in control & study groups. in the both groups (100%) Started neuropathy symptoms (2-4) cycle, above half (66.6%, 60%) were intolerant to symptoms of CIPN (5-7) cycle and both groups (60%) decide to stop continuing of paclitaxel due to CIPN/cycles (8- 11) cycle

Fig (1): Illustrate that statistical significant differences regarding of practical session (massage therapy, exercise, reflexology, cryotherapy and nutrition) at start , after one and after two months of implementing bundle of care instructions p value = <0.001

Table (2): As we show from this table, there was non-statistical significant deference between the control and the study groups at the baseline as regard items of symptoms severity but there was found statistical significant difference between them in the items of symptoms severity after implementing the bundle of care instructions during the periods after one month and after two month p value = <0.001 .

Table (3): Reveals that there was non-statistical significant deference between the control and the study groups at the baseline as regard items of symptoms severity interference to activity daily living instead of that there was found statistical significant difference between the two groups (control & study) in the items of symptoms severity interference to activity daily living after implementing the bundle of care instructions during the periods after one month and after two month p value = <0.001 .

Table (4): Reflects the difference among PIPN -QOL at baseline, after one and after two months of implementation of the bundle of care instructions. It reveals that the mean scores of PIPN -QOL for the study group increased one and two months after the bundle of care instructions implementation compared to baseline with highly statistically significant differences between them at $p < 0.001$

Table (5): Demonstrates that a statistically significant differences regarding sensory neuropathy grading (G1,G2, G3, and G4) at after one and after two months of implementing bundle of care instructions between both groups $p \leq 0.05$.

Table (6): Demonstrates that a statistically significant differences regarding motor neuropathy grading (G1, G2, G3, and G4) at after one and after two months of implementing the bundle of care instructions between both groups $p \leq 0.05$.

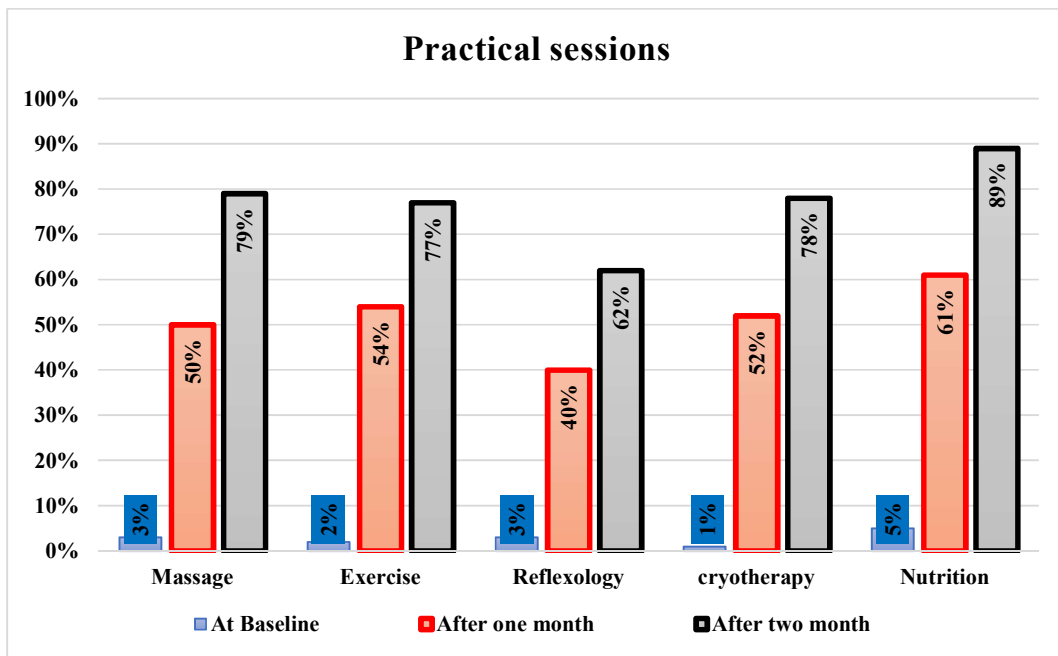
Table (1): Frequency & percentage distribution of demographic characteristic of study vs. control group among patients paclitaxel -induced peripheral neuropathy (n=60)

Demographic characteristic	Control (n=30)		Study (n=30)		χ^2	P.value
	n	%	n	%		
Age group:						
20- < 30 years	9	30%	8	26.7	4.89	0.139
30- < 40 years	14	45.7%	15	%		
40- < 50 years	5	16.7%	4	50%		
50- 60 years	2	6.7%	3	13.3 10%		
Marital status:						
-Single	5	16.7%	7	23.4	2.78	0.249
-Married	22	73.3%	23	76.6		
-Divorced	3	10%	0	0		
Residence:						
- Urban	20	66.7%	18	60%	1.15	0.284
- Rural	10	33.3%	12	40%		
Education level:						
-High education	16	53.3%	14	46.6	5.84	0.120
-Secondary education	8	26.7%	7	%		
-Read and write	6	20%	9	23.4 % 30%		
Occupation:						
-Employee	12	40%	15	50%	1.61	0.657
-Student	8	26.7%	5	16.7		
- House wife	10	33.3%	10	% 33.3 %		
Chemotherapy cycles received:						
- Started neuropathy symptoms (2-4)cycle	30	100%	30	100%	5.73	0.121
-Patient intolerant to symptoms of CIPN(5-7)cycle	20	66.7%	18	60%		
-Patient decide to stop continuing of paclitaxel due to CIPN/cycles (8- 11) cycle	18	60%	18	60%		

A chi-square test In order to compare the variance in proportions, test analysis was utilized.

T-test analysis was used to compare the mean difference between the two groups

*Statistically significant at p = 0.05



* Statistically significant at $p = 0.05$

Fig (1): Frequency & percentage distribution of bundle of care practical session for the study group throughout the study phases (n=30)

Table (2): Mean score of symptoms severity of PIPN for the study group throughout baseline, after one and after two months of implementing bundle of care instructions (n=30)

Symptoms of CIPN	Study Group (n=30)			Test of significance		
	Baseline	After one months	After two months	P ₁	P ₂	P ₃
	Mean ±SD	Mean ±SD	Mean ±SD			
Numbness in fingers or hands	2.94±1.55	1.60±0.90	1.44±0.70	U=987.00 P:0.380	U=163.50 P:<0.001*	U=4.00 P:<0.001*
Numbness in toes or feet	4.040±0.70	2.36±1.04	2.08±0.94	U=990.50 P:0.396	U=231.00 P:<0.001*	U=16.50 P:<0.001*
Tingling in fingers	2.48±1.47	1.52±1.19	1.04±0.49	U=997.00 P:0.422	U=413.00 P:<0.001*	U=69.00 P:<0.001*
Tingling in toes	4.28±1.47	2.08±0.89	1.70±0.90	U=935.00 P:0.202	U=73.00 P:<0.001*	U=20.50 P:<0.001*
Discomfort in fingers or toes	5.42±1.56	3.84±1.33	3.36±1.06	U=950.00 P:0.248	U=366.50 P:<0.001*	U=121.50 P:<0.001*
Sensitivity to cold temperature	3.04±1.27	2.14±1.12	1.96±0.92	U=1035.00 P:0.612	U=538.50 P:<0.001*	U=223.50 P:<0.001*
Muscle or joint aches	5.80±1.14	3.88±1.45	3.48±1.23	U=1062.00 P:0.767	U=189.50 P:<0.001*	U=65.50 P:<0.001*
Weakness in arms or legs	4.00±1.27	3.38±1.14	3.08±1.14	U=1036.00 P:0.632	U=329.50 P:<0.001*	U=143.00 P:<0.001*
Trouble with balance	0.84±1.03	0.70±1.01	0.66±0.93	U=1035.00 P:0.602	U=356.00 P:<0.001*	U=79.00 P:<0.001*

P₁: The differences between study and control group in baseline

P₂: The differences between study and control group after one month

P₃: The differences between study and control group after two months

Mann-Whitney U test : Statistically significant at p = 0.05

Table (3): Frequency & percentage distribution among control and study group related to symptoms severity interference to activity of daily living throughout the study phases (n=60)

The study phases	Control Group (n=30)		Study Group (n=30)		χ^2	P value
	No	%	No	%		
Baseline					0.429	0.889
Not at all interfering	1	3.33%	2	6.67%		
Mild interfering	9	30%	10	33.33%		
Moderate interfering	10	33.33%	10	33.33%		
Severe interfering	10	33.33%	8	26.67%		
After one month					11.88	0.001*
Not at all interfering	0	0	3	10%		
Mild interfering	4	13.33%	13	43.33%		
Moderate interfering	7	23.33%	8	26.67%		
Severe interfering	19	63.34%	6	20%		
After two month					24.91	0.000*
Not at all interfering	0	0	6	20%		
Mild interfering	0	0	17	56.67%		
Moderate interfering	11	36.67%	4	13.33%		
Severe interfering	19	63.33%	3	10%		

Fisher's exact test for qualitative data between the two groups

Chi square test for qualitative data between the two groups

*Significant level at P value < 0.01

Table (4): PIPN- QoL domains among control and study group throughout the three study phases of implementing bundle of care instructions (n=60)

QOL domains/Study phases	Control Group (n=30)	Study Group (n=30)	Z	P value
	Mean±SD	Mean±SD		
Baseline				
-physical well-being	44.7±11.6	44.6±11.6	1.844	(0.065)
-social/family well being	46.8±11.8	47.9±11.9	1.732	(0.066)
-emotional well-being	49.8±17.2	48.7±16.2	1.832	(0.065)
-functional well-being	42.5±10.4	41.4±10.2	1.811	(0.067)
After one month				
-physical well-being	43.5±10.9	64.8±10.1	3.773	(<0.001*)
-social/family well being	49.8±17.2	70.7±6.8	6.938	(<0.001*)
-emotional well-being	45.9±11.8	63.5±9.9	5.893	(<0.001*)
-functional well-being	48.5±16.2	69.0±10.4	6.052	(<0.001*)
After two month				
-physical well-being	39.5±9.2	73.5±14.6	7.894	(<0.001*)
-social/family well being	38.8±8.2	79.8±11.8	6.041	(<0.001*)
-emotional well-being	33.7±9.4	81.5±15.9	7.105	(<0.001*)
-functional well-being	33.8±9.2	83.0±15.3	7.294	(<0.001*)
QOL Total	43.1±10.9	74.5± 13.8	6.535	(<0.001*)

Z: Wilcoxon test

* significant at P value ≤0.05

Table (5): Comparison between control and study group related to sensory neuropathy grading of PIPN throughout study phase (n=60)

Study phases	Control Group (n=30)		Study Group (n=30)		χ^2	P value
	No	%	No	%		
Baseline						
Grade 1	3	10%	4	13.3%	1.15	0.808
Grade 2	7	23.3%	6	20%		
Grade 3	12	40%	11	36.7%		
Grade 4	8	26.7	9	30%		
After one month						
Grade 1	2	6.7%	6	20%	26.14	0.001*
Grade 2	7	23.3%	10	33.3%		
Grade 3	11	36.7%	7	23.3%		
Grade 4	10	33.3%	7	23.3%		
After two months						
Grade 1	2	6.7%	15	50%	56.83	0.001*
Grade 2	4	13.3%	10	33.3%		
Grade 3	11	36.7%	2	6.7%		
Grade 4	13	43.3%	3	10%		

Fisher's exact test for qualitative data between the two groups

Chi square test for qualitative data between the two groups

**Significant level at P value < 0.01

Table (6): Comparison between control and study group related to motor neuropathy grading of PIPN throughout study phase (n=60)

Study phases	Control Group (n=30)		Study Group (n=30)		χ^2	P ₁ value
	No	%	No	%		
Baseline						
Grade 1	4	13.33%	3	10%	1.17	1.030
Grade 2	6	20%	6	20%		
Grade 3	10	33.33%	12	40%		
Grade 4	10	33.33%	9	30%		
After one month						
Grade 1	3	10%	7	23.33%	12.64	0.001*
Grade 2	5	16.66%	10	33.33%		
Grade 3	11	36.66%	7	23.33%		
Grade 4	11	36.66%	6	20%		
After two month						
Grade 1	3	10%	15	50%	28.71	0.0001*
Grade 2	4	13.33%	11	36.6%		
Grade 3	10	33.33%	2	6.7%		
Grade 4	13	43.33%	2	6.7%		

Fisher's exact test for qualitative data between the two groups

Chi square test for qualitative data between the two groups

**Significant level at P value < 0.01

Discussion:

The current study was conducted to investigate the effect of implementing bundle of care on breast cancer patients paclitaxel induced peripheral neuropathy and QOL. The results of the current study showed a significant improvement in symptoms severity, QoL, sensory and motor neuropathy following the implementation of bundle of care. Also the results demonstrate that the defined methodology is successful and that the set hypotheses were realized.

In relation of patient demographics; the current study revealed that vast majority of control and study group their ages ranged between forty and fifty years old.

This supported with the study by **Azim et al., (2023)**, who founded that the age of the study's participants was 41. to 51. But this result is disagreeing with study of **Gado et al., (2022)**, that found the patients' age to be fifty to sixty years.

According to occupation, the largest percentage of patients in both groups who were employed. This may be because of the nature of their work, which makes them more susceptible to carcinogenic agents and cancer triggering factors. This result is consistent with research by **Sung et al., (2022)**, which discovered that most patients diagnosed with breast cancer (BC) were workers.

The results of the current study also demonstrated that the clinical and patient demographic information, including age, marital status, and residence, level of education and chemotherapy cycles received, had no statistically significant differences among the studied patients. These results proved the homogeneity of the study and control groups, ruling out any confounding factors that might have

had an impact on the paclitaxel -induced peripheral neuropathy and quality of live for patients with breast cancer after the bundle of care instructions implementation. Related to symptoms severity of PIPN there was found statistical significant difference between the two groups related to the items of symptoms severity post implementing bundle of care. This is in line with the findings of **Greenlee et al. (2022)**, who assert that the clinical outcomes addressed common symptoms and side effects experienced by patients with breast cancer during paclitaxel treatment or as sequelae of treatment include physical functioning disturbances like : general fatigue, tingling in fingers/toes, muscle or joint aches, weakness in arms or legs, trouble with balance and sensitivity to cold temperature all significantly reduced after frequent using of complementary and integrative therapies. Because it can correct pain, provide a stable joint alignment, and allow stronger muscles. For these reasons, also advise using the supportive nursing guidelines.

According to the symptoms severity interference to activity daily living the current study reported statistical significant difference between the two groups (control & study) in the items of symptoms severity interference to activity daily living after implementing bundle of care during the periods after one month and after two months. This supports a study by **Link et al., (2022)** that reported Nursing Guidelines approaches to managing Paclitaxel treatment symptoms that interference outcomes and decrease daily activities disability have been dropped significantly. This also comforted by the results of **Leonard, (2022)** complementary

therapy, i.e., reflexology, that was administered to women with advanced breast cancer for symptom management during medical treatment with chemotherapy, significantly improve perceived functional status, and activity daily living.

Regarding QOL The results of this study showed that, the mean scores of QOL for the study group increased one and after two months after bundle of care instructions implementation compared to baseline with highly statistically significant differences between them at $p < 0.001$

These findings are consistent with **Trotti et al., (2021)**, who discovered that almost all the control group was at a higher risk of negative impact on a patient's QOL whilst implementing complementary educational guidelines with study group can prevent patients from taking part in daily activities, relationships, social events, community activities, as well as work or school, which can have financial consequences, such as loss of employment and health insurance.

,In the same field **Hershman et al.,(2023)** confirmed in similar study that chemotherapy-induced peripheral neuropathy (CIPN) is a common treatment-related adverse effect and affects long-term quality of life. It has the potential to result in chemotherapy dose reductions and/or early discontinuation.

The study findings demonstrate that all grading regards sensory neuropathy to both groups showed statistically significant differences. This is in line with a study by **Cavaletti & Zanna,(2023)** which found that the most frequent improvement in the sensory corresponds to paresthesias and tendon reflexes. From researcher point of view; the reduction in sensory neuropathic grade can be attributed to the nursing

protocol intervention and its positive effects, which placed an emphasis on important information and recommended practices for neuropathic care. Patients with PIPN require complex nursing care. Developing programs that educate patients' families about on-site care is another responsibility of the nurses.

Then **Stubblefield et al., (2023)** commented after that neuropathy predominantly consists of sensory symptoms and is dose dependent. Sensory axonal damage with reduced amplitude of the sensory nerve action potentials (SNAPs) is a common finding in patients, continue, symptoms get progressively worse, without improvement between doses. When Paclitaxel -induced peripheral neuropathy develops, it is reported to be partially reversible in approximately 40% of patients and completely resolves in approximately 80% at 6 to 8 weeks after fulfillment of nursing intervention protocol.

In the current study patients of the study group demonstrates a statistically significant differences regarding motor neuropathy grading after implementing bundle of care $p \leq 0.05$. These results were confirmed by **Wolf et al.,(2022)** he mentioned that in addition motor problems is still a difficult clinical issue that following chemotherapy treatment, may also be the cause of motor axonal damage. Paclitaxel-induced acute neuro-toxicity is characterized by a unique spectrum of acute motor symptoms occurring in the hours to days following infusion. These symptoms include sever muscle cramps, post therapeutic neuralgia. and walking imbalance and Following an educational protocol that includes special exercises greatly reduces these symptoms and thus

helps the patient complete the treatment doses.

The current study results reveals that range of motion exercises, reflexology, cryotherapy, and mind - body therapy are important to strengthen muscles and joints as a way to increase mobility and prevent suffering. They are an essential to be established to assist patients return to normal activities as quickly and safely as possible. They make a patient flexible by gradual increasing the range of joint and muscle movement, and lowering sensory and motor neuropathy this lead to improving QOL.

Conclusion: The study concluded that mean scores of PIPN -QOL for the study group increased one and two months after guidelines implementation compared to baseline with highly statistically significant differences between them at (G1, G2, G3, and G4). Implementing bundle of care instructions has a positive effect on paclitaxel -induced peripheral neuropathy and quality of life.

Recommendations:

For clinical practice:

- The bundle of care instructions should serve as the basis for routine nursing care for patients receiving paclitaxel to improve their peripheral neuropathy and quality of life. It should be implemented once patient admitted for chemotherapy cycles.

- Inform the patient about the importance of regular range-of-motion exercises, mind - body therapy and nutrition to avoid complications that could lower their quality of life.

- Encourage more investigation or researches to pinpoint the obstacles leading to failure to continue prescribed therapeutic regimen and other relevant statistical tests.

Future implications:

- It is advised that the current study be repeated using a larger probability sample drawn from various geographic regions for the generalization of the findings.

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