

## Original Research



# Effectiveness of Self-care Measures on Knowledge, Self-efficacy and Performance Status among Cancer Patients

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**Abstract****Introduction:** There is a growing concern regarding self-care and chemotherapy side effects. The present study aimed to assess the effectiveness of self-care measures on knowledge, self-efficacy, and performance status among cancer patients undergoing chemotherapy.**Methods:** A quasi-experimental study was conducted in Dr. Kamatchi Memorial Hospital, India. Using purposive sampling technique, 200 cancer patients were selected. Patients were interviewed using semi-structured knowledge questionnaires, Modified Stanford Patient Education Research Center Self-efficacy scale, deliberate self-efficacy with rating scale under four subheadings, and ECOG Performance Status Scale with 5-point grading scale i.e., dead to fully active.**Results:** There was adequate knowledge (95%) on self-care measures after the intervention. The mean score was significant, i.e., 21.33 (2.25), which had difference between post-knowledge score in experimental and control was statistically significant at  $P < 0.001$  level. The majority of patients reported a high self-efficacy level ( $t = 198.60$ ,  $P < 0.001$ ). In addition, despite self-efficacy and knowledge the performance status observed at each cycle, i.e., 4 cycles had mean score of  $t = 32.13$ ,  $P < 0.001$ , showed high level of performance status.**Conclusion:** The study revealed that the self-care measures during each cycle had improved the self-efficacy and performance status to high level, which in turn reduced the side effects of chemotherapy to the certain level.**Introduction**

Cancer is now the third leading cause of death worldwide, with >12 million new cases and 7.6 million cancer deaths estimated to have occurred in 2007.<sup>1</sup> By 2030, it is projected that there will be ~26 million new cancer cases and 17 million cancer deaths per year.<sup>2</sup> Moreover, the global distribution of cancer and types of cancer that predominate continues to change, especially in economically developing countries. Low- and middle-income countries accounted for about half (51%) of all cancers worldwide in 1975; this proportion increased to 55% in 2007 and is projected to reach 61% by 2050.<sup>3</sup> Cancers of the lung, breast, colon/rectum and prostate are no longer largely confined to Western industrialized countries but are among the most common cancers worldwide.<sup>3</sup> India is likely to have over 1.73 million new cases of cancer and over 0.88 million deaths due to the disease by 2020 with cancers of breast, lung and cervix topping the list, according to premier medical research body.

Among males, the leadings sites were mouth, tongue, lung, esophagus, hypopharynx, and larynx, whereas in females they were breast, cervix, ovary, mouth, tongue and myeloid leukemia. Majority of cases were found in

the age group of 35-64 years and the proportion in male and female in this age group was 62.51% and 71.05%, respectively.<sup>4</sup> Annual declines of 5% to 6% in individuals aged 65 years and older are particularly striking because rates in this age group were increasing prior to 2013. It is also notable that long-term rapid increases in liver cancer mortality have attenuated in women and stabilized in men.<sup>5</sup> For every 2 women newly diagnosed with breast cancer, one woman dies of it in India.<sup>6</sup> The top five cancers in men and women account for 47.2% of all cancers; these cancers can be prevented, screened for and/or detected early and treated at an early stage. This could significantly reduce the death rate from these cancers.<sup>7</sup>

In Chennai, the total cancer burden is predicted to increase by 32% by 2012-2016 compared with 2002-2006, with 19% due to changes in cancer risk and a further 13% due to the impact of demographic changes. The annual cancer burden predicted for 2012-2016 is 6100 for Chennai city, translating to 55 000 new cases per year statewide (in Tamil Nadu). Breast cancer would dislodge cervical cancer as the top-ranking cancer in the state, while lung, stomach and large bowel cancers would surpass cervical cancer in ranking in Chennai by 2016. In

order to tackle the predicted increases in cancer burden in Tamil Nadu, concerted efforts are required to assess and plan the infrastructure for cancer control, care, and ensure sufficient allocation of resources.<sup>8</sup>

Cancer can be treated by surgery, chemotherapy, radiation therapy, hormonal therapy, targeted therapy and synthetic deadliness. The choice of therapy depends upon the location and grade of the tumor and the stage of the disease, as well as the general state of the patient (performance status). A number of experimental cancer treatments are also under development. Chemotherapy is the most effective and widely used treatment in most types of malignancies.<sup>9</sup> Cancer treatment is increasingly effective but is associated with short- and long-term side effects. Increases in cancer prevalence have been leading to the ever-improving treatment modalities. The main strategy of chemotherapy drugs based on the phenomenon that these drugs selectively target the tumor cells, largely by the means of genotoxicity partially caused by the production of reactive oxygen species,<sup>10</sup> which does not specifically damage the cancer cells but also the normal cells.<sup>11</sup>

Chemotherapy is an important component of treatment for many cancers, and new anti-cancer drugs represent one of the largest areas of pharmaceutical development.<sup>12</sup> However the nature of chemotherapy means that while damaging cancer cells it also damages healthy cells, leading to side effects.<sup>13</sup> The side effects of chemotherapy affect an individual's physical health, quality of life and emotional state.<sup>14,15</sup> The most frequently encountered short-term side effects seen with standard adjuvant chemotherapy regimens and their relative frequency and severity are fatigue, nausea, vomiting, oral mucositis and neutropenia as a short-term effect, has been recognized in recent years as a common side effect of cancer chemotherapy.<sup>16-21</sup>

Self-care behavior was performed and followed by the patients before side effects become persistent or severe through prior information of side effects and their management techniques. In addition, Stromberg advocates teaching self-care to encourage persons with cancer to increase their sense of self-control and lessen feelings of helplessness that often accompany cancer and its treatment. The nurse is further challenged to teach patients to actively participate in their care rather than remaining dependent on the health-care professional. Using skill as a patient educator, the nurse enlists the patient and family members in a partnership to promote self-care. This requires the nurse to use great creativity and flexibility to individualize the approach to patient management problems.<sup>22</sup> Educating patient for self-care orientation is the main objective of intervention.<sup>23</sup> According to Foster and colleagues, cancer patient self-management is an individual's strategies for controlling disease conditions to maximize well being, or approaches chosen by an individual to optimize living conditions with cancer.<sup>24</sup> The Self-care Symptom Management program is a psycho-education program with the goal of enhancing

patients self care abilities to manage the side effects of chemotherapy, and thus improve the quality of life of adult cancer patients and their family caregivers. The Self-care Symptom Management program represents a promising intervention to promote self-care management for cancer care in Indonesia.<sup>25</sup> Several side effects are caused in cancer patients as a result of chemotherapy, which may further get more complicated making it difficult for patients to maintain a normal life. Higher symptoms burden will have a profound impact on patient's quality of life and level of psychological distress. For minimizing these side effects several cheap, readily applicable and effective self-care measures are available. Which when taught to patients will help them to effectively overcome the side effects of chemotherapy and live a healthy and positive life. More over the family members are also involved in this study for watching and reinforcing the cancer patients self-care measures at home because the relationships in India is much stronger than anything else. Therefore objective of the present study is to explore current perspective on educating the self-care measures of side effects among chemotherapy recipients, in relations with self-care activities and perceived effectiveness of the activities to improve knowledge, self-efficacy and performance status by getting rid of side effects of chemotherapy.

### Materials and Methods

This quasi-experimental study was done. The study was conducted in Dr. Kamatchi Memorial hospital in south India from 01/11/2015 to 30/09/2016 for period of 11 months. Patients who were receiving the chemotherapy in chemotherapy ward of the institute were considered as the sample population. Inclusion criteria were patients diagnosed to have Breast, Oral, Oesophagus, Stomach and Rectal Cancer aged between 35-55 years not received chemotherapy prior to study and undergoing for first cycle of chemotherapy. However, patients with metastasis to bone, complicated by fracture, open wounds or radiation dermatitis, complicated by infection and coagulation disorders, complicated by bruising and internal haemorrhage were excluded.

After receiving approval from the ethics committee of the study hospital, IEC vide letter no. 14A/NCCP-05/2014 samples who agreed to join the study were allocated randomly assigned into groups. Allocated sequence was resolute by block randomization ratio 1:1 with block sizes of 2 and 4 using a lottery method. The samples were instructed to collect the lottery. Samples receiving even numbers received chemotherapy from block A considered as experimental group and odd numbers received chemotherapy from block B considered as control group. Based on previous study, Cohan's d was used to calculate approximately the sample sizes of an experimental group and a control group that are of equal size and the desired confidence level of 95%, a power of 80 to detect an effect size of 0.30 standard deviations.<sup>26</sup> Therefore, the sample

size calculation formula showed that at least 103 patients and the researcher had included 110 samples including attrition for each study and control group. Data collection proforma was used to confine data. All the cancer patients who are receiving chemotherapy in chemotherapy ward and who met the inclusion criteria were included in the study.

The data collection proforma contained four sections. Section-1 contained the socio-demographic characteristics and clinical profile of participants (Duration of cancer during diagnosis, family history of any type of cancer, type of cancer and duration of surgery, stage of cancer, chemotherapy agents being administered). Section-2 comprises of semi structured questionnaire on knowledge, which had two aspects; chemotherapy & side effects related - 10 questions and self-care measures related -15 questions. Sum of scores sorted from 0 to 25, the higher score states adequate knowledge. Section-3 consists of modified Stanford emotional self-efficacy scale to assess the self-efficacy had totally 25 questions, i.e., physical self-efficacy -10, Exercise Regularly Scale -3 Psychological Self Efficacy -8 and Social/Recreational Activities Scale -4 questions in rating scale. Respondents were asked to score each statement on a five-point scale, from 0 indicating "not at all" to 4 indicating "very much". Sum of scores ranges from 0 to 100 were calculated for each subscale. The higher score imparts the high self-efficacy. Section-4 composed of ECOG Performance status (PS) scale with six points, score ranging from 0 (fully active) 1(restricted physical activity), 2 (ambulatory), 3 (limited self-care) 4 (completely disabled) to 5 (dead),<sup>27</sup> the higher score determines the low performance status.

Study was evaluated by 1 medical oncologist, 1 surgical oncologist, 1 psychiatric nursing specialist, 1 clinical psychologist, 5 medical surgical nursing specialist and 1 statistician through an external peer review process for the purpose of validation of the self-structured questionnaire. In this study, the internal reliability using Cronbach's alpha was 0.86 for knowledge scale, 0.89 for the self-efficacy scale and 0.94 for the performance status scale. After attaining the contents of the data collection proforma validated, a pilot study was conducted among 20 patients in each group i.e., experimental and control to check the feasibility and data collection proforma was administered for all subjects.

Brief information about the risk and benefit of this study were explained in detail and understandable manner. Oral and written informed voluntary participation consent was taken from each participant. Pre intervention data was collected with help of questionnaire regarding demographic variables, knowledge, self-efficacy and performance status by the researcher for 15–20 minutes through face-to-face interview with each participant who was eligible and met the inclusion criteria on the first day of first chemotherapy cycle in the room before starting chemotherapy cycle for both experimental and

control group. A booklet prepared by the researcher which was validated by the experts. It composed of 20 pages and covered introduction of chemotherapy, route of administration of common chemotherapy drugs followed in cancer study centre, selected side effects of chemotherapy, its self-care measures, Usage of ice chips, foot massage comprises of following steps ankle circling, sole rub, toe stretch, T-shape fan, thumb circling and completion of long slow strokes over entire foot and deep breathing exercise includes pursed lip and diaphragmatic breathing. Self-care measures entrenched with distribution of information, teaching of skills and provision of support. In distribution of information researcher gave the booklet to each sample and explained the content through power point presentation (both visual in pictorial form and oral) along with the family care givers in a group of 10–12 members in a room prior to their chemotherapy administration. Ice chips prepared by researcher in the following steps. Step 1: Plain water is gently poured into the standard ice cube maker of (4 × 2.5) size. Step 2: The ice cube maker is sealed with an aluminium foil and 7 cm ice cream sticks are placed in the center of each cubical space, and kept to freeze for 2-3 hours. Step 3: Once it is frozen the ice cubes are ready to be served to chemotherapy patients. Samples were instructed to keep the ice chips inside the mouth in contact with the inner cheek wall of the oral cavity, the right side first and then on the left side, thereby cooling the oral cavity. Teaching of skills comprises of two divisions i.e., (a) the samples from experimental group received ice chips 5 minutes prior to, maintained 5 minutes during infusion and 5 minutes after infusion of chemotherapeutic agent. (b) Researcher takes sample to the treatment room and demonstrates foot massage with steps and deep breathing exercises individually. At the end of the skills learning stage the participants were asked to demonstrate the techniques they had been taught and to review the information they had been given. All participants were instructed verbally to perform foot massage and deep breathing exercise by self in their home twice daily morning and evening for next six days. To assess conformity of the interventions, the participants were asked to record foot massage and deep breathing exercise on a diary as well cross checked by the family care givers. During provision of support researcher was also in touch with the patients over the phone every day to ensure the correct completion of the intervention and taken help from the family care giver but the control group received the hospital routine which was the existing care provided to all cancer patients in the study cancer center.

On 7<sup>th</sup> day (1<sup>st</sup> week) during follow up of first cycle ( $T_0$ ), samples were assessed for post test of knowledge, self-efficacy and performance status in both experimental and control group. 28 days completes a cycle. Self-efficacy and performance status were assessed using modified Stanford Emotional self-efficacy scale and ECOG performance

status, a self-administered questionnaire, at three time points; second cycle 5<sup>th</sup> week (T<sub>1</sub>), third cycle 9<sup>th</sup> week (T<sub>2</sub>) and fourth cycle 13<sup>th</sup> week (T<sub>3</sub>) after the intervention; during their 7<sup>th</sup> day of follow up visit from second cycle to fourth cycle at the cancer study centres.

The data were analyzed using the Statistical Package for the Social Sciences SPSS version 21. Between-group comparisons with respect to nominal, ordinal, and numerical variables were performed through the chi-square and the independent-sample *t* tests, respectively. Moreover, within-group comparisons were done via the paired-sample *t* test. *P* values less than 0.05 were considered significant.

## Results

In total, 220 cancer patients participated in this study. The total population of the research was 200 patients, of which 20 were not included in the study 7 participant due to stage IV Metastasis 8 other types of cancer, 2 radiation therapy and 3 refused to participate. 200 patients entered the study and were randomly divided into two groups: intervention and control each 100 completed the study (Figure 1).

The results showed that the intervention and the control groups were homogeneous and did not reveal statistically significant differences in terms of age distribution, sex, marital status, economic status, type of work, religion, occupation and clinical variable like duration of cancer diagnosis, family history, chemotherapy drugs being administered. However there were statistically significant differences between them in terms of educational background, body mass index (BMI), Stage of cancer during chemotherapy (Table 1).

Both the intervention group and the control group had reported inadequate knowledge prior to chemotherapy cycles. To have occurred most of the time seven days following the surgery [the Mean (SD) 7.21 (4.95) and 5.33

(4.32), respectively]. There were no significant differences between the two groups in this regard. However, seven days after the first chemo cycle (T<sub>0</sub>), intervention group had adequate knowledge through PPT and handbook distribution [the mean (SD) 21.68 (2.39)], respectively. But, the control group remained having inadequate knowledge [the mean (SD) 5.84 (4.95)] (Table 2).

Between-group comparisons, using the independent *t* test. The independent samples *t* test revealed that before the intervention, there was no significant difference between the groups with respect to the mean score of self-efficacy (*P*= 0.623) and performance status (*P*= 0.799), despite the fact that after the intervention, the mean score of self-efficacy and performance status in the experimental group was significantly lower than that for the control group (*P* = 0.000) from first cycle (T<sub>0</sub>) to fourth cycle (T<sub>3</sub>). Moreover, the results of the repeated ANOVA test illustrated that the mean score of self-efficacy (*F* = 3857.37, *P* = 0.000) and performance status (*F* = 24.995, *P* = 0.000) in experimental group positively significantly after the intervention, while it remained negatively significant in the control group (*F* = 622.77, *P* = 0.000). (*F* = 181.43, *P* = 0.000) . (Figures 2-5). The correlation between the knowledge and self-efficacy, knowledge and performance status & self-efficacy and performance status were statistically correlated i.e., (*r* = 0.502, -0.367, -0.347) at *P*<0.01 value.

## Discussion

Self-care measures put into action in this study entrenched with distribution of information, teaching of skills and attainment of support through teaching, demonstration, reinforcement via telephone calls or family care givers to cancer patients suffering from side effects of chemotherapy. The findings of this study showed that level of knowledge, self-efficacy and performance status gradual progress

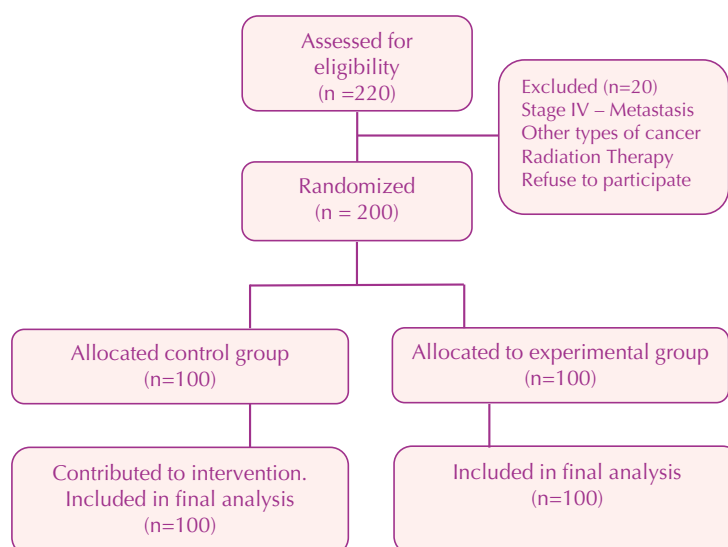


Figure 1. Flowchart of study

**Table 1.** Demographic variables of the participants

Demographic variables	Experimental group	Control group	P
	No. (%)	No. (%)	
Educational status			
No formal education	15(15)	22 (22)	0.02*
Primary school	21(21)	22 (22)	
Middle school	37(37)	20 (20)	
High school	22(22)	30(30)	
Graduate.	5(5)	6(6)	
Body mass index			
Less than (15.0-18.4)	77(77)	90(90)	0.04*
Normal weight (16.5 - 24.9)	21 (21)	9 (9)	
Overweight (25.0-29.9)	2(2)	1 (1)	
Obesity (30.0-39.9)	0(0.00)	0(0.00)	
Stage of cancer during chemotherapy			
Stage I	0(0.00)	0(0.00)	0.03*
Stage II	55 (55)	40 (40)	
Stage III	45 (45)	60 (60)	

PG: post graduate

\*Statistically significant

**Table 2.** Comparison of knowledge among cancer patients undergoing chemotherapy

Knowledge	Before chemo cycle Mean (SD)	7 days after chemo cycle Mean (SD)	P
Experimental	7.21 (4.95)	21.68 (2.39)	0.00*
Control	5.33 (4.32)	5.84 (4.95)	0.41

SD: Standard deviation. \*Statistically significant.

than the control group from first cycle (T0) to fourth cycle (T3) significantly improved all the four outcomes.

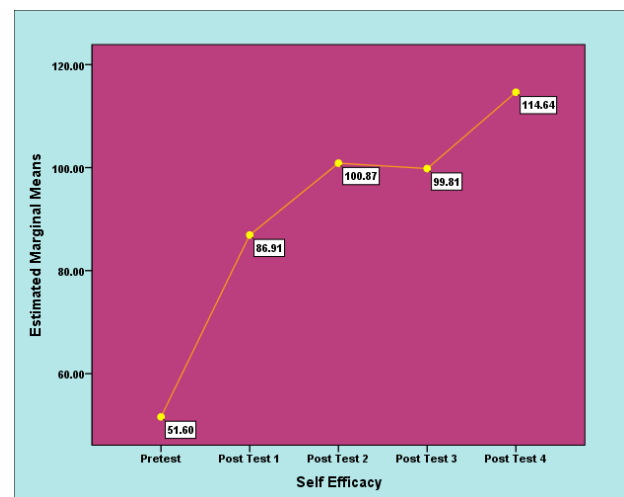
The comparison of post -test level of knowledge score among cancer patients in experimental and control group. In experimental and control group the post-test first cycle (T<sub>0</sub>) mean score were 21.33 and 5.84 and SD is 2.25 and 4.95. The difference between post knowledge score in experimental and control was statistically significant at *P* < 0.001 level in first cycle (T0). This shows the distribution of information through power point presentation and handbook was very effective to improve the knowledge regarding selected side effects of chemotherapy and its self-care measures among cancer patients.

This result is supported by Connell et al, evaluated whether pre-chemotherapy teaching sessions improved patient knowledge and anxiety. Improvement was seen in knowledge of treatment schedule (mean score increase from 2.5 to 3.4, *P*<0.001), side effects (mean score increase from 2.3 to 3.4, *P* <0.001), and how to use medications designed to prevent and treat nausea (mean score increase from 1.8 to 3.2, *P* <0.001). A pre-chemotherapy teaching session improves patient knowledge about the planned treatment along with reduction in anxiety.<sup>28</sup>

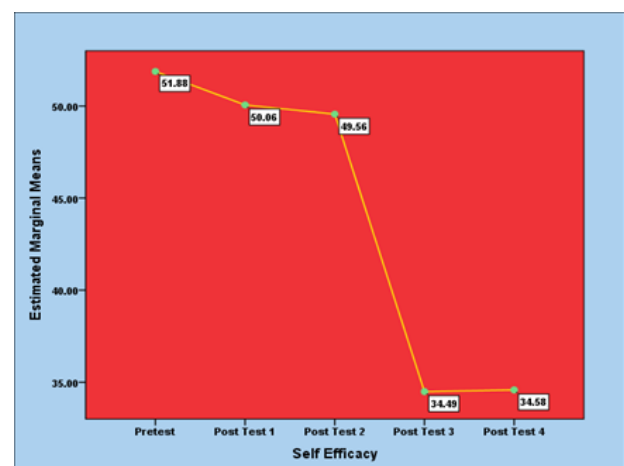
In experimental group the pre-test self-efficacy mean

score was 51.60 and SD was 4.25. After self-care measures the post-test first cycle (T0) to fourth cycle (T3) self-efficacy mean score was 86.91, 100.87, 99.81 and 114.64 and SD was 2.93, 3.47, 3.06 and 4.91. In control group the pre-test self-efficacy mean score was 51.88 and SD was 3.78. The post-test first cycle (T0) to fourth cycle (T3) self-efficacy mean score was 50.06, 49.56, 34.49 and 34.58 and SD was 3.46, 4.50, 2.21 and 2.23. The difference between pre and post-test from first cycle (T0) to fourth cycle (T3) in experimental group shows self-efficacy score was strong and it was statistically significant at *P* < 0.001 level. This shows the self-care measures during each cycle improves the self -efficacy to high level which in turn reduces the side effects.

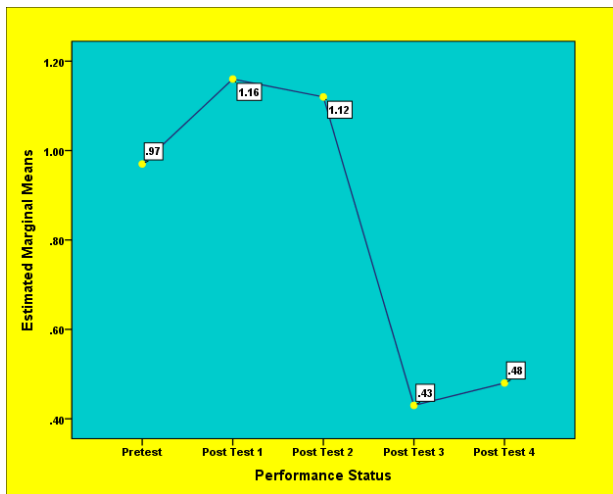
This result is supported by Prapti et al., study aims to develop a foot massage program to support care activity in reducing nausea and vomiting for cancer patients undergoing chemotherapy. Massaging has been recommended as an aid in reducing the side effects of treatment with cancer, specifically nausea and vomiting.<sup>29</sup>



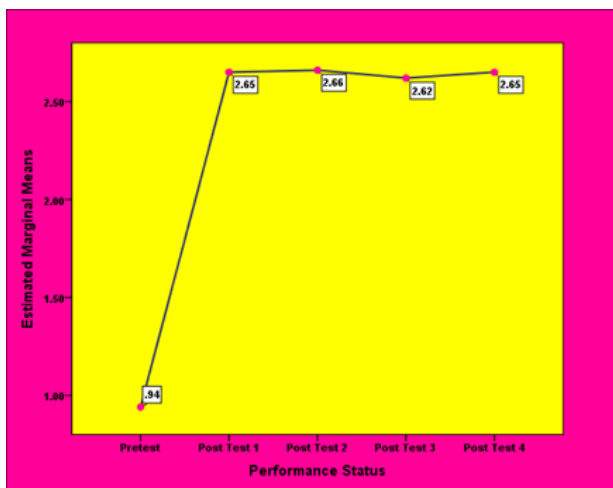
**Figure 2.** Trend graph showing pre-test and post- tests mean self-efficacy score in experimental group .



**Figure 3.** Trend graph showing pre-test and post- tests mean self-efficacy score in control group



**Figure 4.** Trend graph showing pre-test and post- tests mean performance status score in experimental group



**Figure 5.** Trend graph showing pre-test and post- tests mean performance status score in control group

Study was to determine the effectiveness of pranayama on cancer-related fatigue among breast cancer patients undergoing chemotherapy as measured by cancer fatigue scale. Pranayama can be used as a supportive therapy for breast cancer patients undergoing chemotherapy.<sup>30</sup> Katrancı et al., oral cryotherapy has a significant contribution to the protection of oral health by reducing mucositis score according to the WHO mucositis scale, especially on the 7th and 14th days. Nurses' awareness of how cryotherapy can affect patients and options for resolving problems will enable them to provide a higher standard of individualized care.<sup>31</sup>

In experimental group the pre-test performance status mean score was 0.97 and SD was 0.83. The post-test from first cycle (T0) to fourth cycle (T3) performance status mean score were 1.16, 1.12, 0.43 and 0.43. The SD is 0.77, 0.81, 0.49 and 0.50. The difference between pre- and post-performance status score was powerful and it was statistically significant at  $P < 0.001$  level. In control group the pre-test performance status mean score was

0.94 and SD was 0.82. The post-test from first cycle (T0) to fourth cycle (T3) performance status mean score was 2.65, 2.66, 2.62 and 2.65. The SD was 0.47, 0.47, 0.48 and 0.47. There was not much difference between pre- and post-performance status and it was not statistically significant at  $P < 0.001$  level. This shows the self-care measures and self-efficacy will surely improve the performance status of cancer patients.

This was supported by Tian et al., aimed to assess the relationships of patient education with the severity of treatment-induced side effects, daily calorie and protein intake, psychological status, and performance status in patients with lung cancer. The study patients were divided into an intervention ( $n = 62$ ) and a control group ( $n = 110$ ). We observed significant differences between the intervention and control groups with respect to low daily protein intake (54.84% vs. 70.00%,  $P = 0.046$ ), prevalence of depression (51.61% vs. 70.91%,  $P = 0.011$ ), prevalence of severe side effects of treatment (14.52% vs. 37.27%,  $P = 0.002$ ), and good performance status (75.81% vs. 55.45%,  $P = 0.008$ ). Our results suggest that educating patients about cancer treatment and rehabilitation can lead to increased protein intake, a lower prevalence of depression, and lesser side effects from cancer treatments, and improved performance status.<sup>32</sup>

## Conclusion

The results of present study showed that performing self-care measures by chemo patients can reduce side effects of chemotherapy and improve the self-efficacy and performance status of daily activity in patients undergoing chemotherapy. Together with firm family support, self-care measures can be an effective one with cost effectiveness. Educating chemo patient along with caregiver about side effects of chemotherapy and self-care measures would surely enable them to use in their daily practice to improve patients self-confidence and performance status. Educational booklets can also be provided to different groups of healthcare professionals, particularly chemotherapy ward nurses, family members of cancer patients and students in order to improve their self-care measures related knowledge and practice. The suggestion for the future studies were the following:

- The same study can be done with large sample size so that the results can be generalized.
- Comparison of self-care measures for side effects with other types of management can be conducted.
- Studies can be conducted to assess the Knowledge and Practice of Medical and Paramedical personnel's regarding self-care measures.
- Studies can be conducted to assess the awareness and practice in rural areas.
- The same study can be done on different settings with experimental design. Studies to assess the quality of life improved by self-care measures.

## Research Highlights

### What is the current knowledge?

Self-care measures advised and taught by the chemo nurse before chemotherapy administration but how patient perceives and follows in daily life is unidentified.

### What is new here?

This concept, the researcher was advocate for the hospital, the model has been appreciated and accepted. Self-care measures which self-satisfactory is been carried out in this study to boost up the self-confidence of cancer patients. The findings can be applied anywhere and also self-care measures are cost effective.

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## Ethical Issues

After approval from Institute Ethical committee, permission was obtained from the Institute of Ethical Committee (IEC) of Dr. Kamatchi Memorial Hospital, (Reg. No:14A/NCCP-05/2014). Informed consent was obtained oral and in written from every participant after a brief explanation regarding the study by the investigator. Confidentiality of the data, the right to depart from the study, and the secrecy of the participant were explained before data collection.

## Conflict of interest

There are no conflicts of interest.

## Author's Contributions

VPS: Conceived and designed the study, Conceptual framework, Development of tools, Data collection, Data analysis, Interpretation, Manuscript preparation, CS: Designed the study, Manuscript review.

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