Chapter V

Discussion, Implications, Limitations, Recommendations & Conclusion
CONCLUSION, IMPLICATIONS, LIMITATIONS AND
RECOMMENDATIONS

This chapter presents a brief summary of research study, conclusions, and its implication in the field of nursing. Recommendations for future research and limitations of the study are also presented in this chapter.

Summary of the study

The study attempted to determine the effectiveness of Pranayama on side effects of radiation therapy like cancer related fatigue among breast cancer patients. It further explored the level of antioxidant enzymes and non-enzymatic antioxidants among these patients with or without performing Pranayama in an effort to identify the possible mechanisms behind the development of cancer related fatigue.

The objectives of the study were to:

1. determine the effectiveness of Pranayama on
   1.1 cancer related fatigue among breast cancer patients undergoing radiation therapy as measured by cancer fatigue scale.
   1.2 selected biochemical parameters among breast cancer patients undergoing radiation therapy.

2. determine the relationship between cancer related fatigue and reduced glutathione among breast cancer patients undergoing radiation therapy.
The study aimed to test the following hypotheses among the breast cancer patients admitted for radiation therapy in Kasturba Hospital, Manipal. All the hypotheses were tested at 0.05 level of significance.

$H_{1.1}$: There will be a significant difference in the pretest and post-test scores of cancer related fatigue among the experimental group as measured by cancer fatigue scale.

$H_{1.2}$: There will be significant difference in the scores of cancer related fatigue between the experimental group and control group as measured by cancer fatigue scale at the completion of radiation therapy.

$H_{2.1}$: There will be a significant difference in the pretest and post-test level of serum protein thiols among the experimental group.

$H_{2.2}$: There will be significant difference in the level of serum protein thiols between the experimental group and control group at the completion of radiation therapy.

$H_{3.1}$: There will be a significant difference in the pretest and post-test level of glutathione (GSH) among the experimental group.

$H_{3.2}$: There will be significant difference in the level of glutathione (GSH) between the experimental group and control group at the completion of radiation therapy.

$H_{4.1}$: There will be a significant difference in the pretest and post-test level of serum glutathione S transferase among the experimental group.

$H_{4.2}$: There will be significant difference in the level of serum glutathione S transferase between the experimental group and control group at the completion of radiation therapy.

$H_{5.1}$: There will be a significant difference in the pretest and post-test level of glutathione reductase among the experimental group.
H$_{5.2}$: There will be significant difference in the level of glutathione reductase between the experimental group and control group at the completion of radiation therapy.

H$_{6.1}$: There will be a significant difference in the pretest and post-test level of glutathione peroxidase among the experimental group.

H$_{6.2}$: There will be significant difference in the level of glutathione peroxidase between the experimental group and control group at the completion of radiation therapy.

H$_7$: There will be a significant relationship between the scores of cancer related fatigue and the level of glutathione (GSH)

H$_8$: There will be a significant relationship between the scores of cancer related fatigue and the level of protein thiols

H$_9$: There will be a significant relationship between the scores of cancer related fatigue and the level of glutathione S transferase

H$_{10}$: There will be a significant relationship between the scores of cancer related fatigue and the level of glutathione peroxidase

H$_{11}$: There will be a significant relationship between the scores of cancer related fatigue and the level of glutathione reductase

**The present study assumed that**

1. Breast cancer patients undergoing radiation therapy experience some amount of fatigue

2. Lack of antioxidants and antioxidant enzymes increase the side effects related to cancer treatments.

3. Antioxidants and antioxidant enzymes could be playing a role in the development of cancer related fatigue among breast cancer patients undergoing radiation therapy.
4. There is possibly a relationship between the level of glutathione (GSH) in the body and cancer related fatigue among breast cancer patients undergoing cancer treatments.

5. Pranayama may reduce the amount of cancer related fatigue experienced by breast cancer patients undergoing radiation therapy.

6. Pranayama may influence the level of antioxidants and antioxidant enzymes in the body.

The study adopted an evaluative approach with design as randomized controlled trial. The study was based on Lydia E Hall’s theory of Care, Core and Cure and competition model of radio protection by Urtasun RC and Brown JM. The study group consisted of a total of 160 patients which included both the control group (80) and the experimental (80) group. The patients were allocated into experimental group and control group using block randomization procedure. The patients in the experimental group performed Pranayama along with radiation therapy whereas patients in the control group received radiation therapy only. The experimental group of patients performed Seethali, Brahmar and Nadisodhana Pranayama. Nadisodhana Pranayama was done for 21 - 25 cycles (approximately 5 minutes), Sheethali for 50 - 60 cycles (approximately 5 minutes) and Brahmar for 10 cycles (approximately 8 minutes). Patients who were having locally advanced breast cancer and who underwent Modified radical mastectomy or Breast conserving surgery, followed by 8 cycles of chemotherapy [Doxorubicin 60 mg/m² IV d1] Cyclophosphamide 600 mg/m² d1] 3 weekly* 4 cycles Followed by Paclitaxel 175mg/m² IV 3 weekly* 4 cycles] were enrolled in this study. After chemotherapy, patients were given radiation of 50 Gy in divided doses. The study was conducted, when the patients came for radiation therapy. Blood was collected from both the group at the beginning and at the completion of radiation therapy and analyzed for serum protein thiols, serum glutathione...
S transferases, glutathione peroxidase, glutathione reductase and reduced glutathione. Cancer related fatigue was assessed before the starting of radiation therapy and at the end of radiation therapy from both the groups using Cancer Fatigue Scale. The pretesting and reliability of the tool and pilot study was done in the same setting before the starting of the main study. The main data collection period was from January 2010 to August 2012.

The data were analyzed using SPSS (16.0). The major findings of the study are summarized below:

**Major findings of the study**

- Majority of the breast cancer patients under study, i.e., 140 (87.5%) were in stage 2 and stage 3.
- 123 (76.87%) patients have undergone modified radical mastectomy
- 118 (73.75%) patients had hemoglobin levels below 12g/dl.
- Both the experimental group (61) and control group (70) had only mild fatigue at the beginning of radiation therapy.
- Very few women in the experimental group (9) and control group (7) had severe fatigue at the beginning of radiation therapy.
- The difference in the scores of cancer related fatigue experienced by the patients between the experimental group (19) and control group (31) at the completion of radiation therapy was significant (p 0.001).
- The difference in the level of glutathione between the experimental group (26.6) and control group (19.1) at the completion of radiation therapy was significant (p 0.002).
• The difference in the level of protein thiols between the experimental group (243.56 ± 106.4) and the control group (216.13 ± 62.86) at the completion of radiation therapy was significant (p 0.001).

• The level of Glutathione S transferase at the beginning of radiation therapy in the experimental was 2.40 when compared to control group 3 which is statistically significant (p 0.004).

• The difference in the level of Glutathione S transferase between the experimental (3) and control group (6.56) at the completion of radiation therapy was significant (p 0.010).

• The difference in the level of Glutathione Reductase between the experimental (1) and control group (1.29) (p 0.524) and the difference in the level of Glutathione Peroxidase between the experimental (0.64) and control group (0.64) (p 0.524) at the completion of radiation therapy are not significant.

• The relationship (Spearman rho -0.013) between pre-test scores of cancer related fatigue and the pre-test level of reduced glutathione (p 0.906) was not significant.

• The relationship (Spearman rho -0.161) between pre-test scores of cancer related fatigue and the pre-test level of protein thiols (p 0.141) was not significant.

• The relationship (Spearman rho -0.105) between pre-test scores of cancer related fatigue and the pre-test level of glutathione S transferase (p 0.337) was not significant.

• The relationship (Spearman rho -0.188) between pre-test scores of cancer related fatigue and the pre-test level of glutathione peroxidase (p 0.083) was not significant.

• The relationship (Spearman rho -0.151) between pre-test scores of cancer related fatigue and the pre-test level of glutathione reductase (p 0.167) was not significant.
Conclusions

Based on the study findings, the following conclusions were drawn

The findings of the study show that Pranayama could influence in reducing the cancer related fatigue and increasing the level of non-enzymatic antioxidants whereas it did not have any effect on enzymatic antioxidants among breast cancer patients receiving radiation therapy. It was also observed that there was no significant correlation between cancer related fatigue and the level of non-enzymatic antioxidants (glutathione and protein thiols) and antioxidant enzymes (glutathione S transferase, glutathione peroxidase and glutathione reductase) among these patients.
Implications of the Study

The findings of the study have implications on nursing practice, nursing education, nursing administration, and nursing research.

Nursing Practice

As discussed in the previous chapters, cancer related fatigue is an important symptom experienced by many of the cancer patients. As of now, there are no established guidelines for managing the cancer related fatigue. Nurses on the floor take care of oncology patients day and night and come across the problems of cancer and its treatment like cancer related fatigue. There are many interventions tested by nurses all over the world. Nursing practice focuses on measures to alleviate cancer related fatigue.

Cancer related fatigue should be assessed at regular intervals for patients who are susceptible for it. It is important for the nurses to become aware of these assessment strategies and continuously monitor patients with cancer related fatigue. Even though there are many factors playing in the development of cancer related fatigue, just like pain, it may be easier to use a ten point scale for assessing fatigue in the clinical care settings. The cancer fatigue scale used in this study to assess fatigue may not be appropriate for assessment on a daily basis in the clinical care settings.

Yoga and pranayama can be incorporated into the daily nursing care of patients suffering from cancer related fatigue. Nurses should identify those patients in need and encourage them to do Pranayama while they receive other medical treatments. It is important to provide them with privacy and a calm and peaceful environment.
Nursing Education

Diploma and undergraduate nurses in India do not learn in detail about cancer, its treatments and the various side effects caused by the treatments whereas most of cancer patients are cared for at the bedside by a diploma nurse or an undergraduate nurse in India.

The present study findings showed that cancer related fatigue is an important problem among breast cancer patients. Undergraduate nursing education should emphasize on the details of these aspects of cancer and its treatments as the bedside nurses in India are largely undergraduate or diploma nurses. Exposure to complementary and alternative treatments during the training period will also be beneficial to nurses in managing patients with cancer related fatigue.

Nursing administration

The findings of the present study can be utilized to plan for continuous nursing education programmes on cancer and its treatment. As the number of cancer patients is increasing in India, special emphasis should be given to training nurses in areas of cancer, its treatment and palliative care. Nursing administrators in the hospital must emphasize the need for assessment of cancer related fatigue, monitoring such patients and to prepare a protocol in the management of patients suffering from cancer related fatigue.

Nursing research

Cancer related fatigue is a relatively untouched area in research. The exact mechanism of development of cancer related fatigue is not known. The exact management of patients suffering from cancer related fatigue is not clear. It is a potential area for the nurses to research. The use of other complementary and alternative therapies and their effect on cancer related fatigue need to be researched as well as the pharmacological treatments.
Limitations

1. The study was a single centre study
2. Pretest for biochemical parameters was done only for 80 patients; 40 in the experimental group and 40 in the control group
3. Demographic data like socioeconomic status, literacy status, financial status and employment history were not collected
4. Even though Pranayama was taught in the yoga department for experimental group of patients and they were having supervised practice in a separate room of the hospital, the possibility of contamination could not be excluded since both control group and experimental group of patients were admitted to the same ward.
5. Cancer fatigue scale is a self-reported questionnaire and fatigue is a subjective experience. So it was difficult to capture the exact level of fatigue experienced by the patients.
Recommendations

1. Large scale multi centric randomized controlled trials can be done to assess the effectiveness of Pranayama on breast cancer patients receiving radiation treatment and followed up for a few years to find out whether there is any influence on survival rate.

2. Similar study can be conducted with a larger sample and in different settings to check whether the results are reproducible.

3. Genetic studies on breast cancer patients can be conducted with Pranayama as an intervention to identify the exact mechanism of change in the level of antioxidants while receiving Pranayama.

4. A comparative study employing other complementary and alternative therapies for cancer related fatigue can be conducted to test their effectiveness in reducing fatigue.

5. Qualitative studies can be conducted on breast cancer patients with cancer related fatigue to explore more about the affective and cognitive aspects of fatigue.

6. Since cancer related fatigue is a complex phenomenon, studies on the relationship between inflammatory markers and cancer related fatigue can be conducted to throw more light on the phenomenon.
Summary

This chapter dealt with the summary of the study, conclusions and its implications in nursing field, limitations and recommendations. The results of the study showed that Pranayama was effective in reducing cancer related fatigue among breast cancer patients and improving the level of non-enzymatic antioxidants among them where as it was not effective in improving the level of antioxidant enzymes among them.