ABSTRACT

Cancer related fatigue is experienced by most of the cancer patients at some point during the course of the disease or treatment. Cancer related fatigue is a complex mechanism and many factors are attributed to the development of fatigue among cancer patients. Yet there is no established treatment for cancer related fatigue and it is considered as an expected side effect which is not given much importance. The study attempted to determine the effectiveness of Pranayama on cancer related fatigue among breast cancer patients admitted to Shirdi Sai Baba Cancer Hospital & Research Centre, Kasturba hospital, Manipal. It also measured enzymatic and non-enzymatic antioxidants at the beginning and at the completion of radiation therapy and Pranayama practice to assess the effectiveness of Pranayama on antioxidants. The antioxidants studied were glutathione and protein thiols and antioxidant enzymes were glutathione reductase, glutathione peroxidase and glutathione S transferase. The study adopted an evaluative approach with randomized controlled trial as the research design. One hundred and sixty breast cancer patients were randomized into experimental and control group using block randomization. The experimental group of patients received fractionated radiation therapy for five days a week for six weeks and performed Pranayama (Nadishodhana, Brahmari and Sheethali) for 30 minutes twice daily for five days a week for six weeks. The control group of patients received only fractionated radiation therapy for five days a week for six weeks. Cancer related fatigue was assessed in both the groups using cancer fatigue scale at the beginning and after six weeks at the completion of radiation therapy. The groups were similar with regard to demographic characteristics and other variables at pretest except for the level of glutathione S transferase.
Abstract

There was significant difference in the scores of cancer related fatigue experienced by the patients between the experimental group (19) and control group (31) (p 0.001) at the completion of radiation therapy with the patients in the control group experiencing more fatigue than those who performed Pranayama.

Biochemical parameters like antioxidants and antioxidant enzymes mentioned above were also assessed similarly. Blood samples were collected from both the groups after six weeks at the completion of radiation therapy and analyzed for the levels of serum protein thiols, glutathione (GSH), glutathione reductase, glutathione peroxidase and glutathione S transferase. There was statistically significant difference among the non-enzymatic antioxidants between the two groups at the completion of radiation therapy. An independent sample‘t’ test showed a significant difference in the level of serum protein thiols between the two groups (t = 4.43 p 0.001) at the completion of radiation therapy. A Mann-Whitney U test showed a significant difference (z = 3.07 p 0.002) in the level of glutathione as well. The levels of serum protein thiols and glutathione were higher among the experimental group. There were no statistically significant differences among the antioxidant enzymes between the two groups at the completion of radiation therapy.

The data on cancer related fatigue were collected using cancer fatigue scale. The tool was translated into the local languages Kannada and Malayalam. The reliability for the Kannada tool was found to be 0.82 and for the Malayalam tool was 0.80. Pre testing and reliability of cancer fatigue scale and pilot study were done in the Kasturba Hospital, Manipal. The sample for the main study constituted 160 (80 in the experimental group and 80 in the control group) breast cancer patients undergoing radiation therapy in Kasturba Hospital, Manipal.
After data collection, the data were analyzed using both descriptive and inferential statistics based on the objectives of the study.

**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.

**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 in 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.

**Based on the present study findings the following recommendations were made**

- 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.
- Similar study can be conducted with a larger sample and in different settings to check whether the results are reproducible.
- 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 performing Pranayama.
- A comparative study employing other complementary and alternative therapies for cancer related fatigue can be conducted to test their effectiveness in reducing fatigue.
- Qualitative studies can be conducted on breast cancer patients with cancer related fatigue to explore more about the affective and cognitive aspects of fatigue.
- 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.