



## "AN OBSERVATIONAL STUDY TO EVALUATE THE EXTENT OF RADIATION INDUCED FATIGUE AMONG CANCER PATIENTS RECEIVING RADIATION THERAPY"

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### Abstract

Cancer is a term used to describe a group of diseases characterized by the uncontrollable growth and spread of aberrant cells. Cancer treatment requires multimodality approach such as surgery, radiation therapy, chemotherapy, immunotherapy and targeted therapy etc. Radiation therapy (also called radiotherapy) is a cancer treatment that uses high doses of radiation to kill cancer cells and shrink tumors. When it comes to cancer patients, fatigue is one of the most commonly recognized symptoms in the literature, as well as one of the most common adverse effects of radiation therapy. Radiation-induced fatigue (RIF) is a clinical subtype of cancer-related fatigue (CRF) that occurs during radiation therapy (acute RIF) or persists later, according to the National Comprehensive Cancer Network (NCCN) (chronic RIF). Radiation induced fatigue (RIF) is a severe, persistent, and subjective feeling of physical, emotional, or cognitive fatigue. In this study, we aimed to evaluate the extent of fatigue among cancer patients receiving radiation therapy at the Department of Radiation Oncology in Sri Venkateswara Institute of Medical Sciences, a South Indian tertiary care teaching hospital in Tirupati, Andhra Pradesh. A prospective observational study was conducted, and data was collected from the patients using fatigue scale questionnaire, Multidimensional Fatigue Inventory (MIF).

**Keywords:-** Radiation Induced Fatigue (RIF), Cancer-related fatigue (CRF), National Comprehensive Cancer Network (NCCN), Fatigue, Radiation therapy, Chemotherapy, targeted therapy, immunotherapy, Multidimensional Fatigue Inventory (MIF).

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**DOI:** 10.48047/ecb/2023.12.si10.00151

## **INTRODUCTION**

Cancer is a term used to describe a group of diseases characterized by the uncontrollable growth and spread of aberrant cells [1]. According to World Health Organization (WHO) figures [2], cancer is the first or second major cause of death before the age of 70 in 112 of 183 nations [3]. Most common malignancies being encountered in clinical practice in India are of head and neck, uterine, cervix and breast cancer among others. Cancer treatment requires multimodality approach such as surgery, radiation therapy, chemotherapy, immunotherapy and targeted therapy etc. Surgery, with or without adjuvant radiation therapy, and chemotherapy are the most common therapeutic approaches in the management of head and neck, breast cancer, cervix, long esophagus, and others. The above treatment modalities can be used either alone or in combination. Radiation therapy can be afford both as curative intent and palliative intent. The curative intent treatment is often afford before definitive surgeries (new adjuvant), after surgery and definitive concurrent chemo radiotherapy in management of most of the solid tumors. Several aspects are considered while deciding on a treatment, including tumor metastasis, location, and size, with the goal of maintaining organs, functionality, and appearance [4]. Radiation therapy (also called radiotherapy) is a cancer treatment that uses high doses of radiation to kill cancer cells and shrink tumors [5].

Fatigue is commonly defined as a lack of physical and emotional energy and motivation. It's not the same as sleepiness or drowsiness, which indicate a desire to sleep. Fatigue can be caused by both physical and mental activities. When it comes to cancer patients, fatigue is one of the most commonly recognized symptoms in the literature, as well as one of the most common adverse effects of radiation therapy [6]. Radiation induced fatigue is one of the major distressing side effect affecting the quality of life among patients receiving chemo radiation therapy. Many radiation therapy patients experience fatigue, which prevents them from being as active as they would want. Fatigue normally increases once radiation therapy begins until approximately halfway through the treatment period, then stays about the same until the treatment is completed. After radiation therapy, many patients' fatigue improves [7]. Radiation-induced fatigue (RIF) is a clinical subtype of cancer-related fatigue (CRF) that occurs during radiation therapy (acute RIF) or persists later, according to the National Comprehensive Cancer Network (NCCN) (chronic RIF). RIF is a severe,

persistent, and subjective feeling of physical, emotional, or cognitive fatigue or exhaustion that is unrelated to recent activity and interferes with normal functioning, and is caused by cancer or cancer treatment [8,9], Depression, reduced cognitive function, sleep disturbances, decreased physical activity, and a decline in HRQOL are common side effects of RIF [10].

RIF does not have an optimal pharmaceutical treatment. Activity enhancement, psychosocial improvement, attention-restoring therapy, diet, and sleep are among the five non-pharmacological interventions recommended by the NCCN Practice Guidelines in Oncology to address fatigue associated to cancer and/or cancer therapy [11]. Only aerobic exercise has been found to consistently lower RIF of all the therapies indicated for managing RIF [12]. Physical activity during and after RT has been shown to minimize RIF, according to a growing body of research [13]. With this background we had conducted a prospective observational study to evaluate the extent of RIF before, during and after the treatment with radiation therapy with or without chemotherapy among cancer patients [14-16].

## **MATERIALS AND METHODS**

The study was designed as a prospective study and was conducted at the Department of Radiation oncology in Sri Venkateshwara Institute of Medical Sciences. Ethical approval was obtained from the Institutional Ethical Committee of SVIMS, Tirupati. After regulatory clearance from Ethics Committee, we collected the data from the patients who were diagnosed with head and neck, uterine cervical cancer and breast cancer through patient interviewing, followed by documenting the fatigue score using fatigue assessment scale, before, during and after the treatment. Demographic details such as age, gender, diagnosis, height, weight, prescription patterns, comorbid conditions, number of medications of the patients were recorded. The study was conducted over a period of six months and included 18 to 65 years aged patients who are histo-pathologically confirmed cancer patients having ECOG [Eastern Cooperative Oncology Group] performance status 0-2 and who are willing to sign approved informed consent forms. Excluded patients who already received prior radiation therapy and chemotherapy, lactating and pregnant women.

## **STATISTICAL ANALYSIS:**

All the data was collected with the predesigned proforma and entered in Microsoft excel sheet.

Qualitative variables such as assessment scores of fatigue before, during, at the end using chi-square test. Quantitative variables compared using student t-test. The analysis done using statistical package for the social sciences (SPSS). P value<0.0005 were considered significant.

### Results and Discussion:

The study was attempted to evaluate the extent of fatigue among cancer patients receiving radiation therapy. The study included 27 patients who came to the Radiation oncology department and receiving radiation therapy.

Among the 27 study population, majority of subjects were under the age group of >50 years (n=19) constituting 70.40% of patients followed with age group of 41-50 years (n=6) constituting 22.20% of patient followed with the age group of <40 years (n=2) constituting 7.40% of patients as shown in the Table 1 and Fig 1.

In our study, most patients were women with 92.60 % and 7.40 % were male. Based on the gender the subjects have been separated as shown in the table 2 and fig 2.

### TABLES AND FIGURES

**Table 1** Percentage distribution of respondents according to their age

	AGE	Frequency	Percent
Valid	< 40 years	2	7.40
	41-50 years	6	22.20
	> 50 years	19	70.40
	Total	27	100.00

**Table 2:-** Percentage distribution of the respondents according to their gender

	Gender	Frequency	Percent
Valid	Male	2	7.40
	Female	25	92.60
	Total	27	100.00

**Table-3:-** Comparison of Fatigue in various phases of treatment:

	Fatigue score							
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Fatigue before treatment	27	40.44	7.75	1.49	37.38	43.51	29	57
Fatigue during treatment	20	74.50	6.56	1.47	71.43	77.57	62	87
Fatigue after treatment	20	35.50	6.46	1.45	32.48	38.52	27	50
Total	67	49.13	18.17	2.22	44.70	53.57	27	87

**Table-4:-** Anova analysis of fatigue score in different groups of patients with radiotherapy.

ANOVA					
Fatigue score					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	18625.124	2	9312.562	187.974	0.000
Within Groups	3170.667	64	49.542		
Total	21795.791	66			

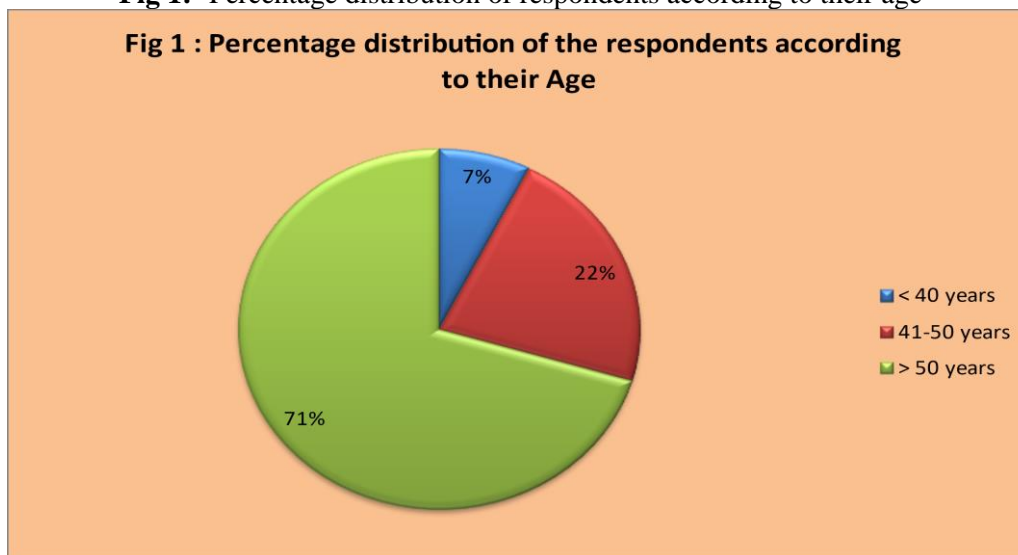
Fatigue is one of the common distressing side effects of radiation therapy in treatment of head and neck, uterine, cervix, breast and others. Fatigue is a sign of many disorders, and the symptoms can be physical, psychological, or a combination of the two, which is most commonly associated with radiation therapy among patients attending the department radiation oncology, SVIMS, Tirupati. Our study emphasizes the importance of assessing the extent of fatigue before, during and after the treatment. In our study a total of 27 patients were considered in the final analysis. The proportion of patients are, 7 percent male (n=2), 92 percent female (n=25). The majority of subjects (27) in the study population were above the age of >50 years (n=19), accounting for 70.4 percent of patients followed by the age group of 41-50 years (n=6), accounting for 22.2 percent of patients, the age group <40 years (n=2), accounting for 7.4 percent of patients. Out of 27 patients, 19 patients of gynaecological cancers (70%), 4 patients of breast cancers (15%) and aero digestive tract (15%).

**Table: 5:-**Multiple comparison analysis of Fatigue score in radio therapy patients:

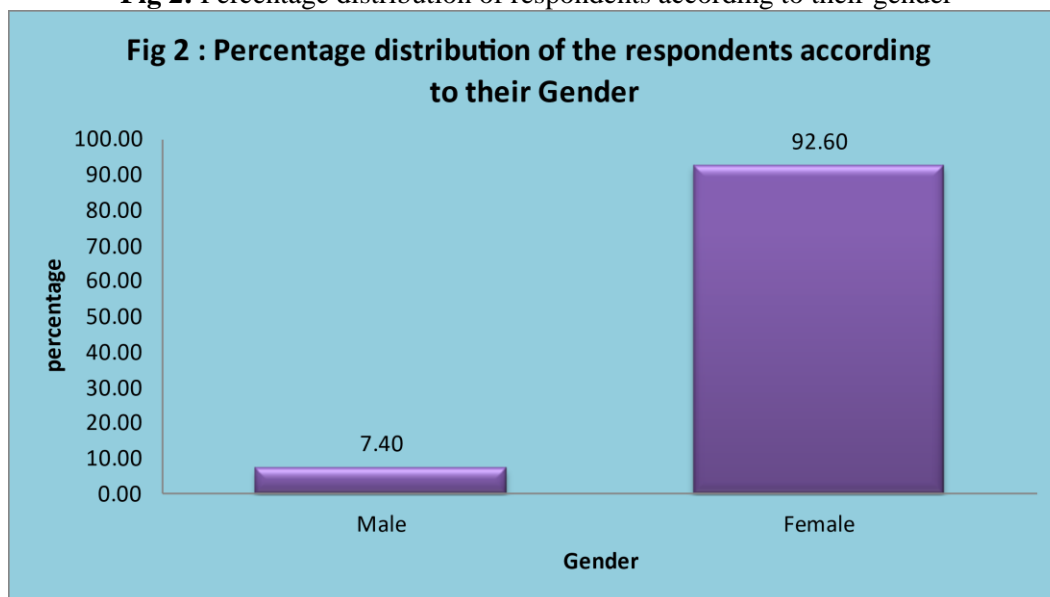
Multiple Comparisons						
Fatigue score						
Tukey HSD						
(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Fatigue before treatment	Fatigue during treatment	-34.056*	2.077	0.000	-39.040	-29.070
	Fatigue after treatment	4.944	2.077	0.052	-0.040	9.930
Fatigue during treatment	Fatigue before treatment	34.056*	2.077	0.000	29.070	39.040
	Fatigue after treatment	39.000*	2.226	0.000	33.660	44.340
Fatigue after treatment	Fatigue before treatment	-4.944	2.077	0.052	-9.930	0.040
	Fatigue during treatment	-39.000*	2.226	0.000	-44.340	-33.660

\*. The mean difference is significant at the 0.05 level.

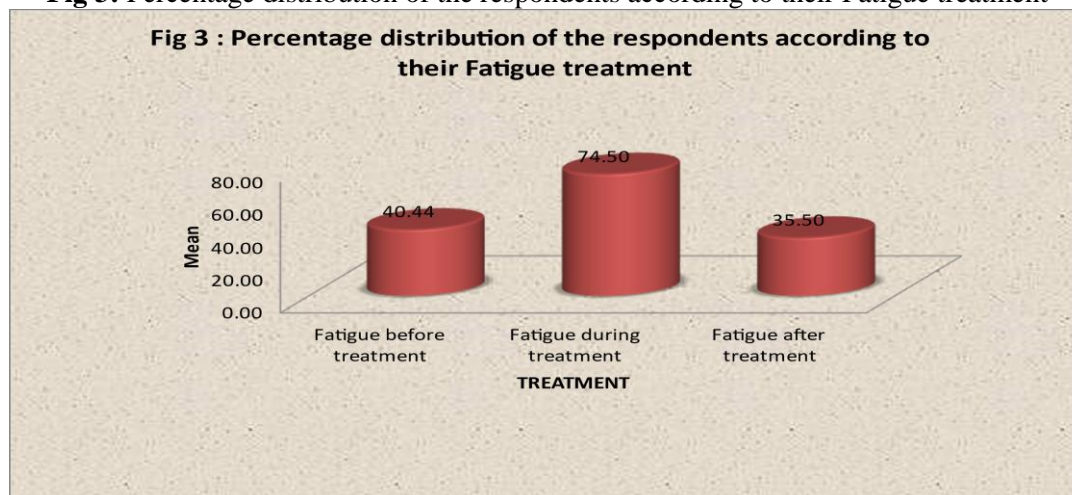
**Fig 1:-** Percentage distribution of respondents according to their age



**Fig 2:** Percentage distribution of respondents according to their gender



**Fig 3:** Percentage distribution of the respondents according to their Fatigue treatment



In our study, we assessed the fatigue levels which shows higher score during RT (87) the range being 20-100; before RT (29) and after treatment score was (27)[17-19]. In a study, states that all patients getting RT for a head and neck tumour have fatigue, which peaks at week 6 of treatment and then gradually fades [20]. In their study, the variables significantly associated, with the mean during-RT fatigue impairment included the following: induction and/or concomitant chemotherapy, thyroid disorders, severe anemia, RT duration, RT-related toxicity (mucositis, dysphagia, weight loss), and need of cortisone during RT [21-24]. Whereas, In our study the carcinoma of cervix is being most common(55%) incidence and all of them were on concurrent chemotherapy or of, mild to moderately anemic and were having RT induced toxicity such as mucositis, dermatitis which could may be the contributing factors towards higher during RT fatigue score(32) [25]. The study by Avelar JMP et al., on 60 subjects of head and neck cancer found all domains of the fatigue scores increased during radiation therapy [26]. The results of our study are consistent with the findings of a prospective study held in Amsterdam with 458 patients, which identified a significant association between radiation induced toxicity with the impairment in physical, emotional, social and role performance domains. In our study, we used a standard scale to assess the fatigue levels in cancer patients receiving RT which may help to assist the patient to prevent, overcome and treat the RIF and to function normal daily activities

## CONCLUSION

From the above findings of the study it may therefore be concluded that increase in fatigue score is significantly associated with the radiotherapy treatment, mostly after 5th week of *Eur. Chem. Bull.* 2023, 12(Special Issue 10), 1270 - 1275

radiotherapy course. Therefore it may be advised to evaluate various domains of fatigue level by using the standardized fatigue assessment scale that may be helpful in detecting and treating early symptoms of fatigue by the health care providers as part of multi-disciplinary care

## CONFLICT OF INTEREST STATEMENT

We declare that we have no conflict of interest.

## ACKNOWLEDGEMENT

The authors are very thankful to Sri Venkateshwara Institute of Medical Sciences, Tirupati for providing necessary research facility to carry out this research work.

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