

Comparative Analysis of Nutritional status of Cancer Patients on Radiation therapy - Day Care

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Abstract

Background: A multifactorial origin can be attributed to the multicellular disease named Cancer. The most prominent treatment for this disease is known as radiation therapy that destroys cancer cells.

Methods: A prospective observational study was conducted in the out patients of Day care department who were undergoing radiation among 30 subjects between 30 - 80 years of age. Subjective global assessment (SGA) method was used to assess nutritional status of patients that was based on anthropometry, biochemical reports, clinical examination and dietary intake of patients.

Results: The results showed that seven patients were at risk of malnutrition while seven patients were malnourished. Majority of patients in this category were suffering from oral, oesophagus and lung cancer. Majority of cases were of oral and breast cancer followed by oesophagus and lung cancer. During radiation therapy, majority of patients showed BMI between 18.5 - 22.9 Kg/M². Majority of patients suffered from loss of appetite, oral ulcers, weakness, mucositis, xerostomia and constipation that led to decreased food intake. Normal nutritional status was found in 50% of patients while 16.6% patients showed state of severe malnutrition.

Keywords

Cancer, radiation therapy, nutritional status, dietary recall, anthropometric measurement

Introduction

Cancer is one of the well known non-communicable diseases identified by the uncontrolled cell growth that has many causative factors including genetics and the polluted

environment and causing a variety of complications such as loss of progressive organ function. It was reported by Indian Council of Medical Research 2016 that new cancer cases in India may reach to 17.3 lakh in 2020 (Nayak et al., 2017). Hanahan and Weinberg (2000) presented different phenotypes or hallmarks of cancer including proliferative cells, angiogenesis, evasion of apoptosis, invasion and metastasis to various body parts. Uncontrolled cell growth may lead to mortality (Chaffer & Weinberg, 2012). An estimation done by The International Agency for Research on Cancer (IARC) showed that 7.6 million worldwide mortality figure was attributed to cancer. Developing countries have significant share of this disease as they accounted for 63% of worldwide cancer deaths (Baskar et al. 2012). Radiation therapy is known to damage genetic material (deoxyribonucleic acid, DNA) of cells by blocking their division and proliferation ability (Jackson and Bartek, 2009).

Nutritional status of cancer patients depends on their stage & treatment of cancer (Baskar et. al 2012). Unintentional weight loss is a common sign in cancer patients. Approximate 30% to 85% of cancer patients have been recognized as malnourished as reported by many studies. Consequently the problem of malnutrition can lead to decreased tolerance to treatment, hampered quality of life and enhanced risk of mortality. Traditionally, loss of body weight, body mass index (BMI), and serum albumin have been considered as indicators to diagnose malnutrition. (Baskar et al 2012).

Malnutrition is one of the alarming condition in cancer treatment that accounts for morbidity. Various researches have shown rate of malnutrition ranging from about 10% to 80% and it has been attributed to 20% mortalities (Koom & Ahn, 2012). Overall malnutrition is associated with risk of infections, toxicity and healthcare expenses. Simultaneously it has been linked to low sensitivity to treatment, reduced levels of compliance, poor life quality that may lead to poor survival of patient. A valid nutritional assessment tool based medical history and clinical examination should be used to assess nutritional status of patients, i.e. Subjective global assessment (SGA) (Lee et al. 2012). SGA is related to prognosis and quality of life also. Therefore the present study was planned with following aim.

Aim

- To assess and compare nutritional status of cancer patients on radiation therapy-day care

Objectives

The present study was planned with the following objectives:

- To collect the general Information and demographic profile of the respondents
- To assess the nutritional status of patients receiving radiation therapy
 - Anthropometric measurements of the respondents
 - Biochemical data of the respondents
 - Clinical signs & symptoms of the respondents
 - Collect the dietary information of the respondents
- Comparison of nutritional status of all patients

Research Methodology

A prospective observational study was planned to assess the nutritional status of cancer patients who have undergone radiation therapy. A sample of 30 patients was taken who have admitted in day care on radiation therapy.

Inclusion criteria

- Patients greater than 30 years age of both genders
- Patients on radiation therapy
- Patients willing to take part in the study

Exclusion criteria

- Patients on chemotherapy
- Unwilling/ non cooperative
- Patients who are critically ill or those with significant cognitive impairment
- **Collection of general information and demographic data:** To collect general information and demographic profile of patients, a well structured questionnaire was prepared and given to patients or attendants (in case patient was not able to fill it) and information was recorded for patient's age, sex, educational status, economic

status, occupation, marital status, lifestyle practices like smoking, alcohol, type of cancer and family history of cancer.

- **Assessment of nutritional status:**

- **Assessment of anthropometric measurements:** Basis data was collected for the assessment. Height of the subjects was measured using a height-meter and weight was recorded by a digital weighing balance. Body Mass Index (BMI) was calculated by the formula: $\text{Weight (Kg)} / \text{Height (M}^2\text{)}$.
- Biochemical reports of the subjects were noted that were prescribed by the doctors. These were majorly for hemoglobin, platelet count, WBC count, etc.
- Clinical signs & symptoms were recorded using a checklist for the following signs and symptoms: Oral ulcers, pain, weakness, mucositis, xerostomia, wasting, cough, anorexia, loss of appetite etc.
- Dietary intake was recorded using a 24-hour dietary recall combined with food frequency questionnaire.

- **Statistical analysis:** ANOVA was applied to find out significant difference and interpretation of data was done.

Results and Discussion

The data collected has been divided into 3 parts –

1. General information and demographic profile of patients
2. Assessment of nutritional status
3. Interpretation of data by statistical analysis

1. General information and demographic profile of patients

Parameters		Total number of patients (N=30)	Percentage
Age	30-40 years	4	13.3%
	40-50 years	6	20%
	50-60 years	9	30%

Place	60-70 years	9	30%
	70-80 years	2	6.6%
	Jaipur	10	33.3%
	Jhunjhunu	7	23.3%
	Alwar	4	13.3%
Educational status	Tonk	9	30%
	Graduate	7	23.3%
	PG	4	13.3%
	Metric	5	16.6%
	Primary	3	10%
	Illiterate	11	36.6%
Working status	Working	9	30%
	Non-working	21	70%
Type of activity	Sedentary	25	83.3%
	Moderate	5	16.6%
	Heavy	0	0
Economic status	LIG	13	43.3%
	MIG	17	56.6%
	HIG	0	0
Type of Cancer	Neck and Oral Cancer	18	60%
	Lung Cancer	2	7%
	Breast & Cervix Cancer	6	20%
	Brain Cancer	2	7%
	Multiple Myeloma	1	3%
	Pancreas Cancer	1	3%

Table 1: General information and demographic profile

Table 1 shows that during the study period, 30 patients were evaluated. The majority of the patients were from the age group of 50 - 60 and 60 - 70 years. There were 21 males (70%) and 9 were females (30%) in which 36% patients were graduate and post-graduate

respectively. 30% people were working while 70% were non-working. Out of 30 patients, 83% patients were having sedentary lifestyle. Patient's majority was from middle income group i.e., 57% and remaining from low-income group. In the study different type of cancers were found in which majority of patients suffered from oral and neck cancer (60%) following with breast and cervix cancer (20%).

2. Assessment of nutritional status

Anthropometric measurement for males

Parameters		Total number of patients (N=21)	Percentage
Mean Height		164.7	-
Mean weight		58	-
Height (cm)	140 - 150	0	0
	150 - 160	6	28.5%
	160 - 170	9	42.8%
	>170	5	23.8%
Weight (kg)	30 - 40	1	4.7%
	40 - 50	5	23.8%
	50 - 60	7	33.3%
	60 - 70	3	14.2%
BMI	>70	4	19%
	Normal (18 - 22.9)	10	47.6%
	Underweight (16 - 17.9)	2	9.5%
	Underweight grade 2 (<16)	1	4.7%
	Overweight (23 - 24.9)	3	14.2%
Obese (>25)		5	23.8%

Table 2: Anthropometric measurement for males

Anthropometric measurement for females

Parameters		Total number of patients (N=9)	Percentage
Mean Height		157	-
Mean weight		55	-
Height (cm)	140 - 150	2	22.2%
	150 - 160	5	55.5%
	160 - 170	3	33.3%
	>170	0	0
Weight (kg)	30 - 40	0	0
	40 - 50	5	55.5%
	50 - 60	3	33.3%
	60-70	1	11.1%
	>70	1	11.1%
	Normal (18 - 22.9)	5	55.5%
BMI	Underweight (16 - 17.9)	2	22.2%
	Underweight grade 2 (< 16)	0	-
	Overweight (23 - 24.9)	0	-
	Obese (>25)	2	22.2%

Table 3: Anthropometric measurement for males

The above two tables are depicting Height, Weight and BMI of male and female patients. It shows mean height of males was between 160 - 170cm (42.8%) and females height was between 150 - 160 cm (55.5%), following with mean weight as 50 -60 kg (33.3%) in males and 40-50 kg (55.5%) in females respectively. As seen in above table it was found that majority of patients both male and female showed their BMI <18.5 kg/M².

Biochemical reports of cancer patients

Parameter		Total number of patients (N=30)	Percentage
Hemoglobin (11.5 to 16.5g/dl)	Normal	13	43.3%
	Low	17	56.6%
	High	0	-
Creatinine (0.52 - 1.25 mg/dL)	Normal	28	93.3%
	Low	0	-
	High	2	6.6%
RBC (4.5-5.50 10^6 /UL)	Normal	6	20%
	Low	24	80%
	High	0	-
WBC (4.0-10.0 10^3 /UL)	Normal	12	40%
	Low	3	10%
	High	15	50.00%

Table 4: Biochemical data

Above table is showing biochemical reports of the patients in which it is evident that 56.6% of patients both male and female were anaemic with low haemoglobin and low range of RBC's. There was high percentage of increased white blood cell count (50%) following with low WBC (10%) leading to infections and inflammations in the body.

Clinical signs & symptoms of cancer patients

Clinical sign/Symptoms	Total number of patients (N=30)	Percentage
Backache	17	56.6%
Oral ulcer	11	36.6%
Weakness	29	96.6%
Mucositis	13	43.3%

Xerostomia	12	40%
Anorexia	19	63.3%
Anaemia	8	26.6%
Loss of appetite	23	76.6%
Fatigue	29	96.6%
Headache	22	73.3%
Skin problems	8	26.6%
Wasting	10	33.3%
Cough	12	40%
Nausea/Vomiting	14	46.6%
Diarrhoea	3	10%
Constipation	4	13.3%

Table 5: Clinical signs & symptoms

From the above table it is clear that 96% of patients had fatigue and weakness. 76% of patients had loss of appetite following with headache and anorexia as 73.3% and 63% respectively. Problem of cough was faced by 40% patients. 33.3% patients showed signs of muscle wasting while 26% patients were anaemic. Complaint of mucositis and xerostomia was common in patients of neck and oral cancers. Mucositis was seen in 13 patients (43%) and xerostomia was seen in 12 (40%) patients out of 30 patients. Skin problems were seen in 8 patients (26%) who were undergoing radiation therapy with problem of constipation and diarrhoea faced by 23% patients out of 30.

Nutrient intake of cancer patients

Nutrient intake as per RDAs		Total number of patients (N=30)	Percentage
Energy	>100%	4	13.3%
	90- 99%	0	0
	80 - 89%	3	10%
	60 -79%	0	0
	<60%	23	77%
Protein	>100%	3	10%
	80-99%	2	7%
	60-79%	4	13.3%
	<60%	21	70%

Fat	>100%	2	7%
	80-99%	0	0
	60-79%	3	10%
	<60%	25	83%
Carbohydrates	>100%	3	10%
	80-99%	3	10%
	60-79%	1	3%
	<60%	23	77%

Table 6: Nutrition intake

Table is representing the mean food intake of cancer patients who were undergoing radiation therapy. It is evident that patient's intake was decreased due to loss of appetite, the energy intake of 77% patients was less than 60 % following with intake of protein, carbohydrates and fat where as 10-13% intake was above normal requirements of energy, protein, carbohydrate and fat.

Antioxidants intake in males -

Nutrient intake as per RDAs		Total number of patients (N=21)	Percentage
VITAMIN C	>100%	0	-
	90- 99%	1	1%
	80 - 89%	2	3%
	60 -79%	3	4%
	<60%	14	20%
BETA CAROTENE	>100.00%	1	1%
	80-99%	0	-
	60-79%	2	3%
	<60%	18	25%

Table 7: Antioxidants intake in males

Antioxidants intake in females -

Nutrient intake as per RDAs		Total number of patients (N=9)	Percentage
VITAMIN C	>100%	5	55%
	90- 99%	0	0
	80 - 89%	0	0
	60 -79%	1	11%
	<60%	2	22%
BETA CAROTENE	>100.00%	1	11%
	80-99%	0	0
	60-79%	0	0
	<60%	8	88%

Table 8: Antioxidants intake in females

Above table 7 and table 8 are showing average consumption of antioxidants in male and female patients respectively. Majority of male patients presented with below 60 % intake of both the antioxidant, while majority of female patients (55%) depicted a trend of >100 % intake of vitamin C. On the other hand, results revealed that 88% females beta carotene consumption was <60% although 11% female showed beta carotene consumption of >100 %.

Nutritional diagnosis

Parameter	Total number of patients (N=30)	Percentage
Well Nourished Normal	15	50 %
Severely Malnourished	5	16.6 %
Mild / Moderate Malnourished	10	33.3%

Table 9: Nutritional diagnosis

Above table 9 is depicting that 50 % male and female cancer patients who were on day care radiation therapy were normally nourished as per SGA tool, while 33.3 % patients

showed mild to moderate level of nutritional status. It is evident that 16.6% patients were severely malnourished.

Conclusion

As per the following study on; it can be concluded that male and female patients who were undergoing radiation therapy faced lots of problems including effect on their nutrient intake as well which led to gap in their nutrient intake. On the basis of tool (Subjective Goal Assessment), which was used to assess nutritional status of patients, it was observed that 50% of patients were well-nourished with SGA rating A, while 33.3% patients were mild / moderately malnourished and 16.6 % patients were at high risk of malnutrition with SGA rating C.

Majority of malnourished Patients (mild / moderate) both males and females were suffering from neck and oral cancer. Other patients suffering from Lung, Breast and Brain cancer, they were under normal category of nutrition parameters.

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