

Effect of Intervention on the Nutritional Status of Selected Cancer Patients

G. Asha, D. Vijayalakshmi¹ and K.V. Veerendra Kumar²

1. Department of Foods and Nutrition, University of Agricultural Sciences,
Bangalore 560 024, Karnataka, India

2. Thoracic Oncology Division, Kidwai Memorial Institute of Oncology,
Bangalore 560 029, Karnataka, India

KEYWORDS Cancer. Disease. Underdeveloped Countries. Tobacco

ABSTRACT Cancer is the most dreaded disease and is the second leading cause of death in many developed and underdeveloped countries of the world. It has thus become major public health problem in the world. Nearly 35-40% of cancers in India are related to tobacco chewing. The present study was conducted at Kidwai Memorial Institute of Oncology and Bangalore Institute of Oncology, Bangalore. The subjects of the study were totally 150 from both the hospitals. Intervention was carried out by feeding finger millet (*Eleusine coracana*) malt for 30 days to see the impact on Body Mass Index (BMI) and serum nutrients. Regarding different stages of dysphagia majority of the patients in both (57.3%) were suffering from dysphagia stage III and 38% of the patients in both were suffering from dysphagia stage II and only 4.6% of the patients in both cancer were suffering from dysphagia stage IV. The mean dietary intake and percent adequacy of nutrients in both male and female patients were much below the RDA except for calcium. There was a significant difference at 1% level for all nutrients except calcium. After the intervention the mean weight, BMI and serum nutrients were increased in experimental group and decreased in control group (hospital diet). Statistically it was found non-significant for BMI and serum nutrients. Thus, the study concludes that feeding the patients with enriched finger millet malt has improved their nutritional status.

INTRODUCTION

Cancer is a complicated multifactorial, multifaceted and multimechanistic disease and is the second leading cause of death in many developed countries. Nutritional and non-nutritional components in the diet seem to influence initiation and promotion of malignant growth. Micronutrients such as β -carotene, vitamin A, riboflavin, folic acid, vitamin C, iron, zinc and selenium which are now claimed to be potent protective agents that act by suppressing carcinogenesis are often deficient in the diets of the poor segments of India's population.

MATERIAL AND METHODS

The present study was conducted on patients of oesophageal cancer attending the out door clinic in Kidwai Memorial Institute of Oncology, Bangalore and Bangalore Institute of Oncology, Bangalore. 150 oesophageal cancer patients with the age group ranging from 35 to 85 years of both the sex were taken, where most of the patients were come from rural area and were agricultural labourers and coolies. The subjects were divided according to different stages of dysphagia. There are 4 stages of dysphagia which are classified based on the type of food the patient is able to eat.

The dietary intake of nutrients were calculated by using 24 hour recall method on 25 per cent of the total sample size and were compared with the RDA. A set of prestandardised cups and vessels were used to obtain estimates of the amount of raw and cooked food consumed. Similarly different sizes of cardboard discs were used to determine the size of idli/dosa etc. Intake of nutrients were calculated by using food composition tables. Intervention was carried out by feeding finger millet (*Eleusine coracana*) malt for 30 days on selected cancer patients (Radio Therapy patients) which was prepared by using malted ragi, malted green gram, WPC (whey protein concentrate), jaggery and dehydrated carrot powder. The control group had hospital diet. 5 ml of blood was drawn from each subject before and after the intervention and weight of each subject was also recorded before and after the intervention. The data was consolidated and analysed statistically.

RESULTS AND DISCUSSION

As seen (Table 1) from the results, dysphagia stage III was found to be higher in both males (58.7%) and females (55.6%) followed by stage II (37.9%, 38%), stage IV (3.4%, 7%) in male and female subjects and no one was found under dysphagia stage I. This may be because most of

the patients come to the hospital in the advanced stage where they were unable to swallow the hard and soft foods. Hence, they were able to take only liquid foods because they have problem in swallowing itself. But stage IV patients were not able to take any kind of foods even water also they can't take in that stage. Therefore totally half (57.3) of the patients were suffering from dysphagia stage III followed by stage II and IV. Chi-square test showed that, there was no significant difference between males and females with respect to dysphagia stages.

Table 1: Classification of subjects according to different stages of dysphagia

Stage	Male (n = 87)		Female (n = 63)		Total (n = 150)		χ^2 value
	N	%	N	%	N	%	
Stage I	-	-	-	-	-	-	0.98 ^{NS}
Stage II	33	37.9	24	38	57	38.0	
Stage III	51	58.7	35	55.6	86	57.3	
Stage IV	3	3.4	4	6.4	7	4.7	

NS – Non-Significant

Table 2 represents the mean intake of nutrients by male patients of dysphagia stage II and stage III. The mean intake of energy, protein, fat, iron, β -carotene, vitamin C and B-complex vitamins were much below the RDA in both the stages of dysphagia. This could be due to the low consumption of foods like cereals, pulses, green leafy vegetables, roots and tubers and fruits and the patients have problem in swallowing itself which reflected in a lower intake of above

mentioned foods. The intake of calcium (423 mg) was adequate in stage III patients it may be due to the fact that majority of the patients who were in the III stage of dysphagia, they will be able to take only liquids such as ragi gangi and also majority of the patients staple food was ragi, but in stage II patients intake of calcium (325 mg) was little less than the RDA. The statistical analysis showed that there was a significant difference in 't' value for all the nutrients at 1% level in both stages of dysphagia except for calcium which was non significant. The per cent adequacy of nutrients in both stages of dysphagia was also depicted in this table. The mean per cent adequacy for all nutrients was very less in both stage patients but for calcium the mean per cent adequacy was 81 per cent in stage II patients and 106 per cent in stage III patients. A special mention should be made for iron which was extremely low with 18 per cent and 13 per cent in stage II and stage III patients respectively. The same was also true for β -carotene which was only 6 per cent and 5 per cent in both the stages.

Table 3 reveals a similar picture of lower intake of all nutrients but the intake was little more than the male subjects. For calcium the intake was more than the RDA. Statistical analysis showed that there was a significant difference in 't' value for all nutrients at 1 per cent level but for calcium there was no significant difference. The per cent adequacy of calcium was 100 per cent and 102 per cent in stage II and stage III patients respectively. The per cent adequacy was only 15 per cent and 13 per cent in stage II and stage III patients respectively. The

Table 2: Mean daily nutrient intake of male subjects in comparison with RDA

Nutrients	RDA	Dysphagia stage II (n = 8)			Dysphagia stage III (n = 7)		
		Intake Mean \pm SD	% Adequacy	't' value	Intake Mean \pm SD	% adequacy	't' value
Energy (K.cal)	2875	541 \pm 198.2	19	33.1**	423 \pm 172.7	15	37.4**
Protein (g)	60	15.1 \pm 4.4	25	28.3**	12.4 \pm 4.0	21	31.0**
Fat (g)	20	5.4 \pm 1.0	27	39.2**	2.4 \pm 0.6	12	76.3**
Iron (mg)	28	5.1 \pm 3.4	18	18.7**	3.7 \pm 2.7	13	23.7**
Calcium (mg)	400	325 \pm 207.6	81	1.0**	423 \pm 181.1	106	0.3*
β -carotene (mg)	2400	142.5 \pm 65.6	6	96.9**	128.01 \pm 103.1	5	58.1**
Vitamin C (mg)	40	10.3 \pm 9.7	25	8.6**	12.6 \pm 10.8	31.5	6.7**
Thiamine (mg)	1.4	0.3 \pm 0.06	21	55**	0.2 \pm 0.1	14	40**
Riboflavin (mg)	1.6	0.26 \pm 0.05	16	140**	0.1 \pm 0.02	11	21.4**
Niacin (mg)	18	2.8 \pm 0.6	15	63**	2.3 \pm 0.4	13	87.1**

** Significant at 1 per cent level

* Significant at 5 per cent level

same was also true for β -carotene and B-complex vitamins. Several experimental and clinical studies have suggested that vitamin A can profoundly modulate the cancer cell growth which has potent cell regulating activity. Antioxidation may be the most important effect of carotenoids in cancer prevention. The present study attempts to throw light up on intake of various nutrients and risk factors of the oesophageal cancer patients.

The results are in conformity with the results of Varma et al. (1996) who estimated the mean daily nutrient intake of calories in males (1091 kcal) and females (1092 kcal), protein in males (28.7 g/day) and females (30.2 g/day) respectively which were below the recommended level and other nutrients like iron, thiamine, riboflavin, niacin and β -carotene were significantly below the recommended dietary allowance.

200 g of ragi malt mix was prepared which provides energy (625 kcal), protein (25 g), fat (1 g), carbohydrate (125 g), fibre (4 g), iron (7 mg), calcium (410 mg) and β -carotene (2026 mg). Ragi malt mix provides good amount of

protein and calcium is meeting the day's requirement. This is because of the addition of WPC (Whey protein concentrate) which is good quality protein and calcium and ragi is a good source of calcium. The mixture also contain good amount of β -carotene, this is because of the addition of carrot powder and the cost of the mix was Rs. 5.50 per 200g packet.

Table 4 reveals that mean weight was increased in control group after the intervention and BMI also increased in experimental group and decreased in control group after the intervention. But statistically it was found as non-significant at 1 per cent level. This is because duration of intervention was only 30 days, suppose if the intervention period in increased upto 90 days or more, better results can be obtained. Hence there has been an increase in the weight and BMI of the experimental group but not to the fullest extent and the patient was able to sustain their life better than the control group. These findings are not in par with the findings of Paul et al. (1989) who stated that 90 days of herbal supplementation resulted in

Table 3: Mean daily nutrient intake of female subjects in comparison with RDA

Nutrients	RDA	Dysphagia stage II (n = 10)			Dysphagia stage III (n = 15)		
		Intake Mean \pm SD	% Adequacy	't' value	Intake Mean \pm SD	% adequacy	't' value
Energy (K.cal)	2225	639 \pm 277.1	29	18.0**	527 \pm 119.9	24	54.7**
Protein (g)	50	15.6 \pm 7.2	31	14.9**	14.9 \pm 4.2	30	31.8**
Fat (g)	20	5.8 \pm 1.6	12	88.5**	2.4 \pm 0.6	29	93.0**
Iron (mg)	30	4.6 \pm 2.0	15	39.0**	3.7 \pm 1.5	13	65.5**
Calcium (mg)	400	401 \pm 155.6	100	0.02 ^{NS}	410 \pm 234.4	102	0.1 ^{NS}
β -carotene (mg)	2400	122.5 \pm 69.0	5	104.2***	129.1 \pm 68.0	5	128.1**
Vitamin C (mg)	40	12.5 \pm 8.9	31.25	9.7**	13.6 \pm 9.2	34	8.07**
Thiamine (mg)	1.1	0.2 \pm 0.06	18	50**	0.1 \pm 0.05	9	83**
Riboflavin (mg)	1.3	0.2 \pm 0.05	15	73.3**	0.1 \pm 0.03	8	171.4**
Niacin (mg)	14	4.5 \pm 0.9	32	37.8**	3.4 \pm 0.8	24	40.6**

** Significant at 1 per cent level
NS- Non significant

Table 4: Influence of intervention on weight and BMI of the control and experimental group

Group	Weight (kg)		't' value	BMI		't' value
	Before	After		Before	After	
Control (n = 10)	43.4 \pm 4.5	41.8 \pm 3.9	0.39 ^{NS}	17.3 \pm 1.6	16.1 \pm 0.6	0.49 ^{NS}
Experimental (n = 10)	42.5 \pm 9.4	45.7 \pm 9.2		17.1 \pm 2.7	18.3 \pm 2.7	

NS = Non-significant

Table 5: Impact of intervention on serum nutrients

Serum nutrient	Normal range	Control (n = 10)		Experimental (n = 10)		't' value
		Initial	Final	Initial	Final	
Ferritin (ng/dl)						
Male	32 - 501	27.3 ± 5.5	23.5 ± 3.7	21.5 ± 10.2	122.5 ± 40.6	0.46 ^{NS}
Female	3.5 - 223.5	18.9 ± 7.7	17.1 ± 7.7	20.2 ± 7.3	109.5 ± 42.3	0.25 ^{NS}
β-carotene (mg/dl)	50 - 250	102.6 ± 7.9	93.8 ± 4.3	80.9 ± 9.0	100.2 ± 8.4	0.38 ^{NS}
Retinol (mg/dl)	30 - 80	22.4 ± 5.1	20.0 ± 0.8	15.6 ± 3.4	20.6 ± 3.1	0.39 ^{NS}
Ascorbic acid (mg/dl)	0.5 - 1.5	0.6 ± 0.08	0.5 ± 0.04	0.4 ± 0.1	0.5 ± 0.05	0.34 ^{NS}
Copper (mg/dl)	70 - 140	136.5 ± 0.6	116.3 ± 7.9	131.2 ± 7.5	133.8 ± 4.0	0.29 ^{NS}
Zinc (mg/dl)	70 - 150	87.9 ± 1.8	79.5 ± 1.9	76.5 ± 5.9	77.6 ± 3.9	0.29 ^{NS}

NS – Non-Significant

weight gain of 1.45 kg in experimental group which was statistically significant at 1 per cent level and control group had loss of weight.

All serum nutrient level was increased in experimental group after the intervention but control group had loss of serum nutrient level after the intervention surprisingly abnormal copper level was found in control group before intervention but was decreased to some extent after 30 days to intervention. Statistically there was no significant difference in the increased serum nutrient level at 1 per cent (Table 5).

These findings are not in conformity with the findings of Chandrashekhar and Paul (1989) who supplemented soyflour for 12 weeks and stated that there were a significant mean increase in the serum retinol, serum iron, serum zinc but mean decrease in the serum copper level was noted in experimental group.

CONCLUSION

The study concludes that the mean nutrient intake and percent adequacy for all nutrients were much lower than the RDA because of

difficulty in swallowing. This makes them to eat less, which will reflect in to poor nutritional status. Deficiency of nutrients especially micro-nutrients will also lead to the development of cancer which are potent anti-oxidants and gives protection against cancer. Feeding the patients with enriched finger millet malt has improved their nutritional status.

REFERENCES

- Chandrashekhar, U. and Paul, H.: Nutrition, lifestyle and supplementation studies on selected cancer patients. *Ind. J. Nutr. Dietet.*, **26**: 219-227 (1989)
- Gopalan, C.: Diet related chronic diseases in India's changing trends. *Bulletin of the Nutrition Foundation of India*, **17**(3): 1-5 (1996).
- Krishnaswamy, K. and Neelam: Chemoprevention. *Ind. J. Nutr. Dietet.*, **36**: 244-254 (1999).
- Paul, M., Sharma, S. and Vijayalakshmi, P.: Prevalence, etiology and herbal supplementation of selected oral cancer patients. *Ind. J. Nutr. Dietet.*, **31**: 136-144 (1994).
- Rajendraprasad, M.P. and Krishnaswamy, K.: Relevance of N-nitrosamines in human cancer. *Nutr. News*, **22**(3): 1-5 (2001).
- Varma, M., Sharma, P.G. and Mahindroo, R.: Food practices and dietary intake of cancer, patients in Jaipur. *Ind. J. Nutr. Dietet.*, **33**: 52-58 (1996).