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A STUDY ON THE PREVALENCE AND MACROBIOTIC APPROACH OF CANCER AMONG THE MALE TRIBAL POPULATION OF SHILLON

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ABSTRACT

Incidence of cancer in northeast is the highest in India. Nutrition intervention plays a vital role in the management of postponement of cancer.

Objectives: To find out the prevalence rate of different types of cancer among the selected male tribal population of Shillong and dietary habits of these tribes the present study was carried out.

Methods: Three hospitals from the city of Shillong was followed up for a period of three months, a total of 125 male inpatients and outpatients visiting during the period were interviewed with well-structured interview to collect data on background information, disease history, anthropometric measurement, clinical assessment, biochemical assessment, lifestyle or health hazards, dietary hazards and dietary assessment including weighment survey to assess for the nutrient intake of the cancer patients for three consecutive days. The PGSGA scoring was done to find the suitable level of intervention strategies. Nutrition intervention through Macrobiotic Approach was given to the patients and their family members using pamphlets, booklet and an e-content.

Results: It was found out during the study that majority of the cancer patients were malnourished. Most of them were non- vegetarian and the rate of health hazards which was recorded among them was high with regards to intake of tobacco, betel nut and intake of alcohol. Dietary hazards also contributes equally towards the risk where it was found out that majority were consuming smoked products and intake of fruit and vegetables was very low among them. As a whole the nutrient intake of the elected 20 subsamples was found to meet the RDA except for β- carotene leading to increase chances of oxidative stress.

Conclusion: The study recommends the need of a special nutrition intervention among the selected male tribal cancer patients regarding the prevention aspects and motivation of patients to incorporate healthy lifestyle habits into their daily life in which macrobiotic approach was considered a stepping stone to accomplish the objectives.

INTRODUCTION: Collectively, non-communicable diseases like cardiovascular disease (including stroke), diabetes and cancer account for approximately two thirds of all deaths in the developed and in developing countries resulting in huge economic losses either directly or indirectly. Cancer is currently the cause of

12 per cent of all deaths worldwide. Over six million people around the world die from cancer each year [1]. The control of non-communicable diseases has increased the life expectancy and therefore exposes more of the population towards the development of non-communicable disease like CVD, diabetes, obesity and cancer. The increase in population due to growth also contributes to the increase in the number of lifestyle disorders. By 2020 two-thirds of the global burden of disease will be attributable to chronic non communicable diseases, most of them strongly associated with diet [2].

There will be approximately 250, 000 new cases of cancer will be registered in India by 2015. Mouth and lung cancer has overtaken stomach and liver cancer to become the leading cause of cancer-related mortality among men living in metropolitan cities. It places the incidence of the disease at 20-33 per 100, 000 in urban India [3].

The same trend prevails in the North-east India but certain types of cancers are relatively very high in the region compared to national figure.

The dietary habits and life style habits of the tribal males in Shillong has been way too far when compared to their present dietary habits, the reason being attributed to the fact that these people has divert more to a westernised diet rather than the traditional region based diet. The diet followed is mainly a non-vegetarian diet with almost 100 per cent of the people eating red meat- like organ meat, liver, mutton, pork and beef. The intake of smoked food items are also very common in this region, whereby people use this smoked products particularly smoked beef, pork and fish which are stored over weeks and months which was then considered convenient for consumption.

The cereals and pulses consumed by the people in Shillong are mainly rice, the staple food of people in this region and pulses intake depends on the type of preparation, vegetables and consumption is being dominated over by the high intake of non-vegetarian foods thus exposing a larger number of the population towards cancer with a commonly diagnosed cases of oesophageal cancer among male and female population [4]. Recent findings relating the occurrence of cancer suggest that modern lifestyles and pollution levels caused by industry in these tribal areas are the main cause of the disease. Intense literature survey shows a strong association between sedentary behavior and cancer risk, and the health outcomes in cancer survivors [5].

MATERIALS AND METHODS:

Selection of area: With the current tribal population of 2, 60,520, Shillong registered a total of 216 and 509 cancer patients in the month of April-July 2010 and August-December 2010 respectively. Owing to this rapid incident of cancer and also since the investigator herself represents the tribal population of Shillong, this area was selected to study of prevalence rate of different types of cancer.

Selection of subjects: The study comprised of conveniently selected three hospitals with a well-functioning oncology department in and around Shillong exclusively treating cancer patients. The selected three hospitals were followed up by the investigator for the duration of three months, male inpatients and outpatients getting treated for the cancer irrespective of age were identified for the conduct of the study using purposive sampling.

Collection of data:

- **Collection of data and conduct of the study:**

Background information: Using a well-structured interview schedule, information regarding the age, sex, education, occupation, income level and family details of the selected male tribal cancer patients were elicited. Details regarding the history of the disease, diagnosis made, treatment suggested, type and duration of the disease were obtained from the hospital records as well as from the interview schedule.

Anthropometric measurement: Since the body measurements are an indicator of nutritional status, the parameters like weight, height, waist to hip ratio and BMI were assessed for the selected male tribal cancer patients using standard techniques.

Clinical Assessment using PG SGA standards: The assessment of the nutritional status of the selected male tribal cancer patients was done using the Patients

Generated Subjective Global Assessment standards developed for the cancer patients. The PGSGA scoring is a good indicator of nutritional status of cancer patients and recommends dietary intervention based on the Triage Recommendation.

The scoring as such was based on the parameters like weight loss, criteria for condition, physical examination and metabolic stress (worksheet 1-4).

Triage Recommendation: The individual score obtained from the PGSGA score (worksheet 1-4) was added and were then rated using triage standard score. Based on the score obtained, the nutritional interventions to be given were then interpreted according to the triage recommendation.

Biochemical parameters: For assessing the biochemical status, a sub sample of 10 male tribal cancer patients were selected at random and biochemical test like SGOT, SGPT, blood count like WBC and RBC, sodium and potassium for electrolyte balance, random blood sugar and hemoglobin level were assessed and compared with standards.

Lifestyle behavior: The lifestyle behavior of the selected tribal male cancer patients like smoking, alcohol consumption, pan/ betel nut chewing, occupational stress/hazards and their exercise pattern were collected using interview schedule.

Dietary habits: Using the same interview schedule, dietary pattern of the male tribal cancer patients was elicited by obtaining information with regards to their present diet history, meal frequency, method of cooking, types of oil used, excess intake of non-vegetarian foods (including smoked or charred meat intake), reuse of oil, inclusion of food additives or artificial colorings or preservatives, intake of antioxidant rich fruits and vegetables. The quantum and frequency of consumption of tea, coffee and fresh fruit juices were also recorded. A food frequency table for the five food groups was also done for selected tribal cancer patients.

Nutrient intake: Out of 124 male tribal cancer patients identified a subsample of 10 male tribal cancer patients were randomly selected to study their nutrient intake. A three days weighment survey was done. The food intake of the subjects was weighed both in raw and cooked form before and after cooking and eating. The leftover food on the plate was also weighed. The cooked volume of the actual food intake was then converted into raw equivalent. The nutrient intake was calculated for both micro and macro nutrients using NIN table of nutritive value for Indian food. The computed nutrient intake was then compared with the RDA of ICMR of Indian foods for nutrient adequacy for normal sedentary male and female. The data collected was treated using appropriate statistical tool.

Nutrition intervention: Based on the triage recommendation and the observation during the study, the investigator had developed a pamphlet, booklet and e-content to serve as an aid for imparting nutrition education to each of the in and out tribal cancer patients and their family members. Counseling was given to manage cancer through macrobiotic approach projected in an e-content and also distributed to all the developed pamphlets and booklets. Macrobiotic approach is a holistic approach towards defending a life with all the required aspects to stay healthy which includes dietary modification, lifestyle modification, behavioral modification, stress modification and finally spiritual modification. These are the aspects which according to the Macrobiotic Approach could help an individual lead a healthy and prosperous life in conjugation with living in harmony with nature.

RESULTS AND DISCUSSION:

Background details:

- The sporadic increase in the incidence of cancer was observed from the age group of 30 years and above. The incidence was higher between the age group of 50-60 years for men (40 out of 124 subjects). The above finding are in lieu with the study conducted by Igor Akuchevic (2008) who claims an incidence rate of 80 per cent of cancer being diagnosed in elderly males [6].
- Majority of the selected male tribal cancer patients (male-104) lived in a nuclear family and the remaining 20 male and 15 female lived in a joint family.

- Only 7 male selected tribal cancer patients lived in small families and the rest of the subjects lived in large families.

- Out of 124selectedtribal male cancer patients, 119 tribal males were married.

- Thirteen male tribal cancer patients were found to be illiterates. Among the literates, 39 males were under graduates and 9 male cancer patients have completed their post-graduation. The same scenario was reported by *Spadea et al.* (2009)- which indicates that less-educated men had higher risks of upper aero-digestive tract, stomach, lung, liver, rectal, bladder, central nervous system and ill-defined cancers, and lower risks of melanoma, kidney and prostate cancers [7].

- Fifty five selected male tribal cancer patients were found to be labourer (manual worker).Also 48 males and 33 females were found to be executives.

- Sixty one selected tribal male cancer patients belonged to economically weaker section (**Table 1**) with their monthly earning less than Rs 3000. While 50 males belonged to a high income group with a monthly earning more than rupees ten thousand. Low socio-economic status is significantly associated with increased cancer risk in high and lower income-countries, across the world [8].

TABLE 1: INCOME STATUS OF THE SELECTED TRIBAL CANCER PATIENTS

INCOME STATUS	TOTAL
	BOYS/MEN (n=124)
Economically Weaker Section (<3000)	61
Lower Income group (3000-7000)	7
Middle Income Group (7000-10000)	6
Higher Income Group (>10000)	50
TOTAL	124

- **Prevalence of different types of cancer among the tribes of Shillong:** Out of 124 tribal male cancer patients (**Fig. 1**), 52 male were suffering from oesophageal cancer. Throat cancer was observed among 32 male. Oral cancer was reported among nine male, similarly stomach cancer was recorded among eight male. Age increases the risk for oesophageal cancer and the disease is more common after the age of 50. Risk for developing cancer of various types is about three times higher in men. In developing countries, major risk factors of oesophageal, stomach, throat, oral and several other forms of cancer include nutritional deficiency associated with lack of fresh fruits and vegetables, regular consumption of very hot beverages, regular ingestion of fermented vegetables, smoking, alcoholism and chewing tobacco [9].

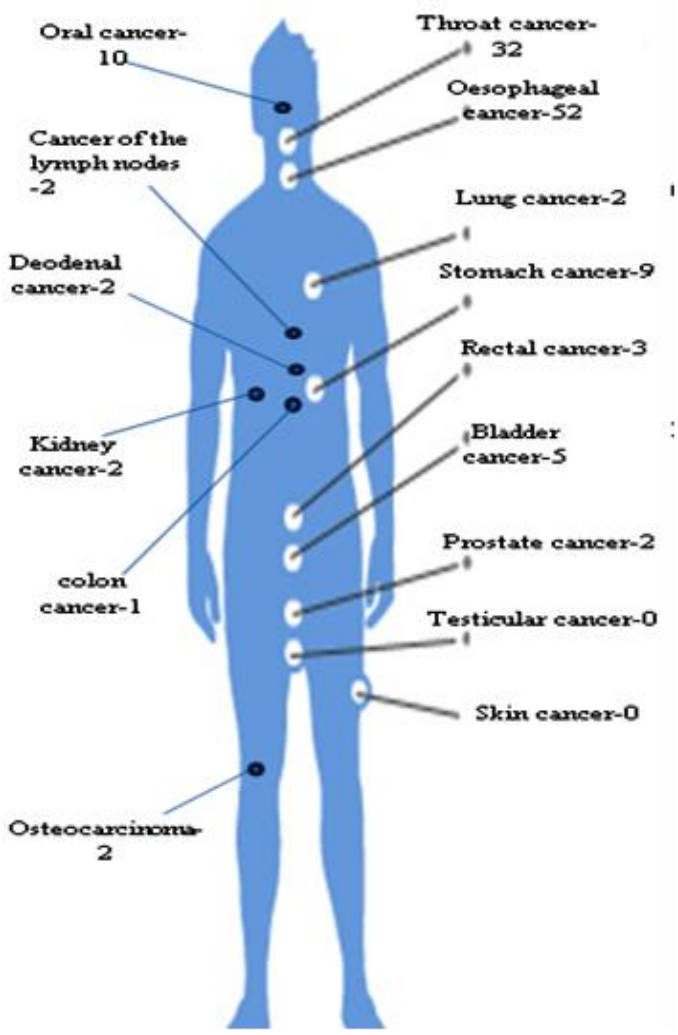
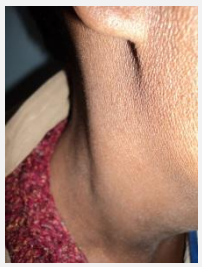


FIG. 1: PREVALENCE OF CANCER AMONG THE SELCTED MALE TRIBAL CANCER PATIENTS OF SHILLONG

- **Symptoms experienced:** The most common symptoms experienced by the selected male tribal cancer patients (**Table 2**) were pain over the region/sites of cancer (110 male), followed by weight loss (91 male) and indigestion (77 male). Other symptoms like fever, nausea and vomiting, fatigue and depression, irritability, loss of appetite, constipation/diarrhoea, bleeding, night sweat, obvious change in moles and lump in the mouth or ulcer were found to be less common among the subjects.

TABLE 2: SYMPTOMS EXHIBITED BY THE CANCER PATIENTS

	SYMPTOMS	TOTAL BOYS/MEN (n=124)
	Pain over any region	110
	Fever	11
	Nausea and vomiting	30
	Weight loss	91
	Fatigue and depression	30
	Constipation/diarrhoea	5
	Bleeding	9
	Irritability	35
	Night sweats	1
	Loss of appetite	34
	Obvious change in mole	5
	Indigestion	77
	Lump in the breast	Nil
	Lump in the mouth or ulcer	11

- **Treatment:** Forty nine tribal male cancer patients were treated for cancer through radiation and chemotherapy. Twenty males underwent radiation therapy alone. Further, nine male cancer patients had a combination of treatment which included surgery, followed by chemotherapy and radiation therapy.

- **Feeding problems:** The common form of feeding problems experienced by the male tribal cancer patients was indigestion (73 male) and loss of appetite 46 male. Least number of male cancer patients (male 20) complained of sore throat.

Anthropometric measurement:

- **BMI:** Out of 124 tribal male cancer patients, 43 men were found to be underweight (**Table 3**). Except for one male, the rest of the subjects had normal BMI and none of the male's subjects were found to be obese. The correlation analyses showed a significant positive association between the BMI and the prevalence of different types of cancer at 5 per cent level of significance.

TABLE 3: BMI OF THE SELECTED CANCER PATIENTS

BMI	MALES (N=122)
Underweight (<18.5)	43
Normal (18.5-25.0)	77
Overweight (25-30)	1
Obese (>30)	Nil
Correlation	**0.1485***

*Significant at 5 per cent level

- **Waist to hip ratio:** One hundred nineteen male tribal cancer patients had lower risk of developing cancer, CVD and other non- communicable disease since their waist to hip ratio was below 0.95 indicating lower risk of developing non-communicable diseases.

Clinical assessment:

- **Weight loss:** Twenty five male tribal cancer subjects including two boys lost 0-4 kg of weight within a period of one month (**Table 4**). Three male subjects, lost 4-8 kg of weight within one month. Whereas, 45male cancer patients 45, lost 4-8 kg over a period of 6 months and 69 subjects (40 male, 29 female) lost more than 4-8 kg over the period of six months.

TABLE 4: WEIGHT LOSS OF THE SELECTED CANCER PATIENTS

WEIGHT LOSS IN 1 MONTH		WEIGHT LOSS IN 6 MONTHS	
Score	**Boys/Men (N=124)**	**Score**	**Boys/Men (N=124)**
2	1	2	Nil
1	3	1	45
0	25 (2 boys)	0	40
Total	**28**	**Total**	**95**

*4 (loss of 16-20kgs in one month); **3 (loss of 12-16kgs in one month); ***2 (loss of 8-12kgs in one month); ****1 (loss of 4-8kgs in one month); *****0 (loss of 0-4kgs in one month)

- **Fat stores:** Nine tribal male cancer patients had severe deficit of fat stores. Likewise 42 male showed moderate deficit of fat store, further it was observed that 27 male did not show any deficit for fat store (**Table 5**).

TABLE 5: PHYSICAL EXAMINATION

PARAMETER / SCORE	BOYS/MEN (n=124)
FAT STORE	9
3	42
2	41
1	
0	27
MUSCLE STATUS	10
3	47
2	37
1	
0	25
FLUID STATUS	Nil
3	8
2	6
1	
0	103

*3 (severe deficit); **2 (moderate deficit); ***1 (mild deficit), ****0 (no deficit)

- **Muscle status:** In case of muscle status 10 selected tribal male cancer patients had severe muscle deficit, 47 male cancer patients, showed moderate muscle deficit, and mild deficit in muscle status was observed among 37 male cancer patients. The prognostic significance of weight loss in cancer patients is well established. Weight loss is strongly associated with poor outcomes from the earliest disease stages through to advanced cancer. The negative nitrogen balance underlying cancer cachexia leads to a significant wasting of skeletal muscle. Muscle loss reduces patient mobility, jeopardizes respiratory function, relates to reduced immunity, and is associated with poor performance status and outcomes [10].

- **Fluid status:** Eight tribal male cancer patients showed moderate fluid accumulation, and remaining 103 male cancer subjects revealed no sign of fluid accumulation. As cites was witnessed among six male.

- **Metabolic stress:** Out of 124 tribal male cancer patients, two male had a severe metabolic stress whose body temperature was more than 102^{o}F for more than 72 hours, and were on a high dose of steroids. Further 114 male did not experienced any metabolic stress and were free from steroids dosage.

- **Triage recommendations:** Score obtained by 96 male tribal cancer patients for triage recommendation indicated need for critical nutrient intervention to manage the symptoms of the disease.

- **Biochemical assessment:** Out of 10 subsamples, three male had elevated SGPT level and similarly two male showed elevated SGOT indicating a poor nutritional status and liver function. Further five male were reported to have abnormal Complete Blood Count. Electrolytes imbalance was observed among two male cancer patients (**Table 6**).

Hyperglycaemia was seen among seven tribal male cancer patients. All the 10 subsample were found to be anaemic with the total haemoglobin level below the recommended standard of (13-18mg/dl for male) which can be attributed to the poor nutritional status owing to disease condition.

TABLE 6: BIOCHEMICAL ASSESSMENT

GENDER	PARAMETERS															
	LFT				CBC				Electrolytes				RBS		Hb	
	SGOT (Upto 30 units)		SGPT (Upto 40 units)		RBC (4.2-6.9 million/µL/cu mm)		WBC (4300-10, 800 cells/µL/cu mm)		Na (Na-136-146mEq/L)		K (K-3.7-5.2mEq/L)		80-110gm/dl		(M=13-18gm/dl) (F=12-16gm/dl)	
	A	N	A	N	A	N	A	N	A	N	A	N	A	N	A	N
MALE (n=10)	4	6	2	8	5	5	6	4	5	5	7	3	7	3	10	NIL

A – Abnormal; N – Normal

Lifestyle or health hazards:

- **Consumption of tea and coffee:** Fifty three male cancer patients consumed tea, followed by flavoured tea (48 males). None of the subjects consumed green tea and lemon tea. It was also observed that none of the subjects consumed more than two cups of coffee/tea day. Consumption of more than six cups of coffee was proved to be a risk factor for many non-communicable diseases.

- **Smoking:** Out of 124 subjects 101 male tribal cancer patients were found to be smoking for the past four years (**Table 7**). Ninety one out of 101 male cancer patients smoked more than 10 cigarettes /day, a number which is a known risk for cancer/cardiovascular disease.

TABLE 7: TYPES, DURATION AND QUANTUM OF SMOKING

TYPES	DURATION		AMOUNT SMOKED PER DAY		TOTAL
	4 Years	5 Years	4-8/day	>10/day	
Beedi	Nil	13	3	10	**13**
Cigarette	Nil	59	2	57	**59**
Pipes	1	14	2	13	**15**
Cigar	Nil	Nil	Nil	Nil	**Nil**
Cigarette/beedi	Nil	14	3	11	**14**

- **Tobacco and betel nut chewing:** Except two male cancer patients, the rest of the tribal patients (male 122) were found to be using tobacco/ betel nut or a combination of both tobacco and betel nut together over the past few years (**Table 8**). Chewing of betel nut was seen more among the males (93 male subjects). Eighty nine male cancer patients chewed either tobacco/betel nut or both for more than ten times a day. According to WHO (2009), although a substantial proportion of the cancers are caused by the tobacco rather than the betel nut and leaves in the quid, betel chewing without tobacco also leads to cancer of the mouth [11].

TABLE 8: TYPES, QUANTUM AND DURATION OF CONSUMPTION OF BETEL-NUT/TOBACCO

Types	Duration >5 years		Amount consumed per day										Total	
	M	F	1-3/ day		4-6/ day		6-10/ day		>10/day		Rarely		M	F
			M	F	M	F	M	F	M	F	M	F		
Tobacco	6	17	1	2	2	4	1	3	1	7	1	Nil	**6**	**17**
Betel nut	93	7	3	1	5	2	11	4	74	1	Nil	Nil	**93**	**7**
Tobacco /betel nut	23	50	2	2	2	3	5	2	14	43	Nil	Nil	**23**	**50**
Total	**122**	**74**	**6**	**5**	**9**	**9**	**17**	**9**	**89**	**51**	**1**	**Nil**	**122**	**74**

- **Alcohol consumption:** On the whole 101 male tribal cancer patients were found to be alcoholic (**Table 9**). Commonly consumed variety of alcohol drinks by the male cancer patients were whisky (40) and local made rice beer (24 subjects). It was found that 21 males consumed up to 400ml of either whisky/ local made rice beer alcohol per day and 57 of the male subjects consumed >400ml/day. The alcoholic were found to be addicted for more than five years.

TABLE 9: TYPES, QUANTUM AND DURATION OF ALCOHOL CONSUMPTION

Types of alcohol	Duration of consumption >5years	Amount of alcohol consumed per day				Total
		>60 ml/day	250 ml/day	400 ml/day	>400 ml/day	
Rum	1	Nil	Nil	Nil	Nil	1
Whisky	40	4	3	7	26	40
Others	24	2	2	7	13	24
Beer/whisky/rum	2	Nil	Nil	1	1	2
Beer/whisky/others	2	1	1	Nil	Nil	2
Whisky/rum/others	9	Nil	1	3	5	9
Whisky/others	11	1	2	1	7	11
Whisky/rum	12	3	4	2	3	12
Beer/whisky	3	Nil	1	Nil	2	3
Total	**104**	**12**	**14**	**21**	**57**	**104**

- **Exposure to carcinogens:** Out of 124 male 101 male tribal cancer patients who smoked were likely to be exposed to tar a carcinogenic substance found in cigarettes.

- **Condition of working or dwelling places**: Eighteen male subjects tribal cancer patients were working in a poorly ventilated environment, whereas, one male experienced heavy exposure to UV rays.

- **Stress experienced:** On observing the related stress parameter it was found that most of the selected male tribal cancer patients (60 male) were frustrated and depressed very often, which was followed by fear and anger (31 male). The release of hormone cortisol in response to physical or psychological stress potentially reduces the function of the immune cells there by influencing the growth of cancerous cell or tumour cell [12].

- **Dwelling and working places:**It was observed that maximum number of the male tribal cancer patients representing the tribal population of Shillong were mainly living in the urban areas namely Nongshilling, Jaiaw, Mawlai, Nongthymmai, Laitumkhrah, Laban and Nongrimbah. Only 50 male cancer patients belonged to different rural parts of Shillong.

Dietary hazards:

- **Intake of smoked meat:** All the male tribal subjects were found to be non-vegetarian, one hundred male consume smoked meat. Frequent consumption of nitrate from animal sources is associated with increased risk of pancreatic cancer. Dietary sources of nitrate include cured, smoked or pickled meats and fish, dried meats, cooked bacon, non-fat dry milk and other protein foods cooked at high temperatures or those preserved with nitrite [13].

- **Reuse of oil:** Reuse of cooking oil was reported among 77 male tribal cancer patients. Reuse of oil is very harmful for health. The more you reuse cooking oil, the more saturated fatty acids get in to our body. Reusing oil causes oxidation-a chemical reaction between oxygen and oil which damages the oil structures in such a way that it becomes detrimental to our health and is known for causing some form of cancer as well [14].

- **Low consumption of anticancer foods:** On the whole poor intake of fruits and vegetables was witnessed among the selected male tribal cancer patients. Daily consumption of fruits was reported only among 37 out of 124 male.

Dietary habits:

- **Meal frequency:** Ninety out of 124 male followed two meal pattern revealing skipping of meal of either breakfast/lunch/ or dinner.

- **Past and present dietary habits:** One hundred and fourteen males had switched on to a better dietary pattern to cope up with the disease. On the whole 10 male subjects did not alter their dietary habit even after their treatment for cancer.

- **Cooking methods:** Boiling was practised by 107 male selected tribal cancer patients. Next to boiling smoking of meat was predominant among 100 male. Poaching of egg /vegetables was not practised by any of the subject. Deep-frying, was observed among 92 male. Dry method of cooking such as grilling or broiling result in production of carcinogens like HCAs (or heterocyclic amines) and acryl amines is similar to deep fat frying [15].

- **Oil consumption:** Mustard oil was used by all the selected male tribal cancer patients for cooking. Twenty nine male used sunflower oil in addition to the mustard oil. Usage of the beneficial oil particularly polyunsaturated fat like safflower, olive and sesame oil was not at all used by the subjects.

- **Cereals consumption:** It was noted that rice being the staple food of the people in Shillong cent per cent of the tribal cancer patients consumed rice on a regular basis, followed by this 17 male consumed maize or corn mainly in the boiled and roasted form. It was surprising to note that only very few subjects consumed fibre rich grains like wheat and oats. Grains like jowar, barley and ragi were not consumed by any one of the subjects.

- **Vegetables consumption:** Vegetable consumption among the male tribal cancer patients of Shillong was very poor. Except for onion, garlic and ginger, the green leafy vegetables rich in antioxidant were consumed by less than 20 subjects. A diet with adequate portions of green leafy vegetables and fruits ensures an intake of roughage or fibre. This has been shown to have beneficial effects on a number of cancers, notably cancers of the colon and rectum [16].

- **Consumption of pulses:** On the whole the intake of different types of pulses was very poor among the selected male tribal cancer patients. Popular pulses like red gram dhal, black gram dhal, green gram dhal and Bengal gram dhal were very rarely used in preparation like dhal soup and dhal fry. Beneficial pulses like soy bean (32 male) and rajmah (30 male) was consumed once in a month. The poor intake of pulses can be attributed to the replacement of fleshy foods on the daily basis.

- **Consumption of nuts and oilseeds:** Only one male tribal cancer patients consumed almond, a rich source of antioxidants. Tree nuts, including cashews, pistachios, almonds, hazelnuts, pecans, and walnuts are nutrient rich foods high in a number of beneficial compounds that promote health and reduce the risk of some chronic diseases including cancer. Research conducted in the past decade indicates that a class of compounds called phytochemicals, which include carotenoids, phenols and proanthocyanidins are particularly important contributors to these effects [17].
- **Consumption of meat/poultry and sea food:** Hundred and eighteen male cancer patients consumed red meat. Daily consumption of fish was observed to be comparatively less among the subjects (male-76) over the meat and poultry consumption.

- **Consumption of fruits:** Fruit consumption among the male tribal cancer patients was found to be very poor in general. Orange was consumed daily by only 18 male cancer patients. The other fruits like kiwi, melon, peaches, apple, plum, guava, papaya and mango were consumed either once in a week or once in a month.

Nutrient intake:

- The mean calorie intakes for calorie, fat, protein, niacin and vitamin C for the male selected tribal cancer patients were significantly higher than the recommended dietary allowance at 1 per cent level of significance (**Table 10**). Likewise a deficit intake for β- carotene was noted at 1 per cent level of significance.

TABLE 10: NUTRIENT INTAKE OF THE SELECTED MALE CANCER PATIENTS

NUTRIENTS	RDA	ACTUAL INTAKE MEAN ± SD	DIFFERENCE	t-VALUE
Energy(kcal)	2320	1942.7 ± 389.03	377.30	3.0670 **
Protein(gm)	60	57 ± 15.06	3.00	0.2698 NS
Fat(gm)	25	71 ± 19.92	46.60	7.3965 **
Carbohydrates(gm)	300	278 ± 19.80	21.90	3.4964 **
Iron(mg)	17	15.06 ± 3.47	1.94	1.7993 NS
β-carotene(µg)	4800	1537.99 ± 875.68	3262.01	11.7798 **
Vitamin c(mg)	40	81.43 ± 23.69	41.43	5.5286 **
Calcium(mg)	600	540.04 ± 249.13	59.96	0.7611 NS

Thiamine(mg)	1.2	1.1 ± 0.50	0.10	0.6283 NS
Riboflavin(mg)	1.4	1.13 ± 0.38	0.27	2.2286 *
Niacin(mg)	16	13.33 ± 2.70	2.67	3.1164 **

*-Significant at 5 per cent level, **- Significant at 1 per cent level, NS –Non-significant

SUMMARY AND CONCLUSION: It was observed that there was not much difference in the nutrient of the male tribal cancer patients when compared with the recommended RDA. Though the nutritional requirement of the male cancer patients for both macro and micro nutrients was high, the selected male cancer patients except for β- carotene met the RDA for sedentary men. Nutrition assessment carried out by the investigator has to a certain extend identified the potential causes and the problems encountered by the cancer patients and served as a basis for framing the contents for nutrition intervention. The macrobiotic Approach which was adopted as a means of nutrition intervention for the selected male tribal cancer patients in the form of pamphlet, booklet and a PowerPoint presentation insisting the strategies for managing cancer among the selected cancer patients will serve as a beneficial guide to retrieve whenever necessary.

REFERENCES:

1. Harmon Eyre, Preventing Cancer, Cardiovascular Disease, and Diabetes - A Common Agenda for the American Cancer Society, the American Diabetes Association, and the American Heart Association, 2008, 109:3244-3255.
2. Dinshaw, K.A,, Cancer: trends in incidence and mortality, 2010, 21: 328.
3. ICMR, MRC Joint Institute, Chronic non-communicable diseases research funding, www.icmr.nic.com, 2010.
4. T.K., Singh, R.K., Parida, D.K., Mohanti, B.K., Rath, G.K. Pre-operative radiotherapy for squamous cell carcinoma of the esophagus-reopening the debate: Results from a North Indian center, International Journal of Surgical Investigation. 2007, 3: 401-406.
5. Brigid, M. Lynch, Reducing sedentary behavior may be a viable new cancer control strategy, Cancer Epidemiol Biomarkers Prev., 19(11): 2691–709.
6. Igor Akushevich, American Association for Cancer Research, Behaviour, Lifestyle Factors Influence Cancer Risk Among The Elderly, Science Daily, 2008 http://www.sciencedaily.com /releases/2008/11/081117153152.htm, Retrieved April 20, 2011.
7. Spadea, W., Abdoul Hossain Madani, Abdolreza Sotoodeh Jahromi, Madhurima Dikshit, Debanshu Bhaduri and Teamur Aghamolaie Socio-Demographic Factors Related to Oral Cancer, Journal of Social Sciences, 2009, 6 (2):141-145.
8. David Conway, Social Inequalities Pose Mouth Cancer Risk, Nov-2008, 2(19):23-26.
9. Stanley G, Vander Hoorn S, Lopez AD, Murray CJ, Ezzati M; Comparative Risk Assessment collaborating group (Cancers). Causes of cancer in the world: comparative risk assessment of nine behavioural and environmental risk factors. Lancet. 2011; 366:1784-1793.[CrossRef][Medline].
10. Neil MacDonald, Alexandra M Easson, Vera C Mazurak, Geoffrey P Dunn, Vickie E Baracos, Understanding and Managing Cancer Cachexia, 197(1).
11. David Zieve, Kuriyama S., Shimazu, T., Ohmori, K., Kikuchi, N., Nakaya, N., Nishino, Y., Tsubono, Y. and Tsuji, I. Green tea consumption and mortality due to cardiovascular disease, cancer and all causes in Japan: the Ohsaki study. JAMA. 2010, 296(10):1255-1265.
12. World Health Organization's Cancer website, WHO. http://www.who.int/cancer/en/. Retrieved 2010-12-27.
13. Ondicoya, K and Mravec, B., Role of nervous system in cancer aetiopathogenesis, Lancet Oncol., 2010, 11(6):596-601.
14. NirmalaShetty, Reuse Oil is not good for Health. (2011)-1.http://www.healthmad.com
15. Karen, A., Dry methods of cooking and its effect on cancer, 2010, www.eHow.com.
16. Ian D' Suaza, Kurahashi N, Inoue M, Iwasaki M, Tanaka Y, Mizokami M, Tsugane S, JPHC Study Group. Vegetable, fruit and antioxidant nutrient consumption and subsequent risk of hepatocellular carcinoma: a prospective cohort study in Japan. Br J Cancer. 2009; 100:181–4.
17. Suzanne Dixon, Head and neck management importance of nutrition intervention, Clin Rev Allergy Immunol., 2010, 10:1–8.

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