TRACKING FOOD AND LIFESTYLE CHANGES PRE AND POST DIETARY INTERVENTION AMONG CANCER PATIENTS

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Abstract

Cancer is an abnormal cells division without programmed cell death, and can metastasize. Cancer incidents are increasing due to nutrition and lifestyle transition. But mortality can be driven by the exposure to risk factors, screening and early clinical and nutritional intervention. This study was conducted with an aim to find out the dietary and social changes post cancer detection and pre dietary intervention and the impact of nutritional counseling. This cross-sectional study included data collection using a questionnaire from100 recently detected cancer patients from tertiary-hospital, using purposive random sampling technique. The mean BMI of males (n=60) was 23.0 ± 5.42 Kg/m^2 and females was 23.7 ± 6.45 Kg/m^2. The dietary analysis revealed 35 patients started consuming vegetables daily and 70% males and 75% females started consuming fruits more frequently post-diagnosis (p=0.04). Younger patients consumed more fruit and vegetable juice (p=0.005). Pre-nutritional intervention some patients had stopped consuming milk (n=19), fish (n=34) and meat (n=35). Twenty out of twenty-five patients quit tobacco, 18 out of the 22 quit smoking, 20 of 21 stopped alcohol consumption post-diagnosis. Sixteen patients had quit their professions and 31 were on job-leave. Forty-four participants stopped routine exercise and 15 stopped outdoor sports, 46 stopped household-chores. Post-dietary intervention, the mean SGA score and dietary compliance improved significantly; p=0.02 and p=0.02, respectively. Mean creatinine, uric acid and fasting glucose levels had decreased significantly. Hence, an early clinical and dietary intervention, may help to regulate the healthy food choices and do have a positive impact on the nutritional-status.

Introduction

Cancer is a disease of an abnormal cells division without programmed cell death, or apoptosis and can metastasize via the blood and lymph systems (National Cancer Institute, 2015). Incidents of cancers are increasing in low- and middle-income countries due to an exposure to a rapid nutrition transition. (Kimokoti et al., 2013).Cancer is the second most common

disease in India responsible for about 0.3 million deaths per year (Ali et al., 2011). The causative factors of cancers may be one of them or both, internal (genetic mutations, hormonal imbalances, poor immune response) and external or environmental factors (dietary patterns, lifestyle practices, industrialization, exposure to pollution, population explosion, addictions, poor awareness and knowledge regarding prevention, diagnosis and treatment, poor economic and hygiene conditions etc.). This ~~also~~ puts a tremendous burden on the Indian economy (Ali et al., 2011).Cancer treatment is long term management. Today, more patients with cancer are living longer due to improvements in treatment, which has increased the cancer survival rates (Howe et al., 2001). The number of survivors are expected to rise with the advances made in the fields of cancer diagnosis, treatment, and care practices. With the cancer detection and its treatment, comes the endorsement and maintenance of healthy behaviors which is masked by the reduction of risk behaviors such as smoking, alcohol, unhealthy diets etc. (Day RW, 1998; Demark-Wahnefried et al., 2005).This may help to reduce the burden of cancer treatment, possibly decrease the risk of recurrence for certain types of cancer, and decrease the risk of non-communicable disease. Hence this paper highlights the prevalence of changes in the dietary and social behavior of cancer patients, post detection and pre dietary intervention, along with the follow up post dietary intervention.

Aim

To find out the dietary and social changes post cancer detection and pre dietary intervention; and the impact of nutritional counseling on the health status of individuals undergoing cancer treatment.

Objectives

1. To assess changes in the dietary habits incorporated pre dietary intervention; post cancer detection.

2. To assess the impact of cancer/ cancer detection on daily activities, profession and socialization.

3. To assess the impact of nutritional counseling on the anthropometric status, biochemical parameters and dietary factors of individual undergoing cancer treatment.

Study Design

This cross sectional study including a total of 100 recently detected cancer patients from Tata Memorial Hospital in Mumbai, using the purposive random sampling technique. Adult men and women who were newly detected and confirmed with solid cancer tumors (except those with head and neck cancers and patients with dysphagia) and also those who had recently started with their treatment without dietary and lifestyle intervention were included in this study.

Data Collection:

Patients attending the Clinical Nutrition OPD clinic for the first time, were interviewed

before their nutritional counseling. Informed consent was obtained from the participants prior to the interview. The anthropometric parameters, dietary intake and the biochemical parameters were assessed on their first visit as well on their follow up visit which was within 22-35 days, post first visit. The questionnaire included general information of the participants (diagnosis, time o-f diagnosis and baseline symptoms).Anthropometric measurements (height, weight, mid upper arm circumference (MUAC), calf circumference (CC) and triceps skinfold (TSF) were measured and BMI (Body Mass Index) and SGA (Subjective Global Assessment) scores were calculated and recorded. Biochemical parameters were also reported pre and post nutritional intervention. Post cancer detection and pre dietary intervention, patients had made certain dietary changes by themselves which were also recorded. Also detailed dietary habits were recorded on follow up visit. Nutritional intake was assessed using a 3-day food diary, using household measures of weights and fluids. Also, changes in the activity, lifestyle and socializing pattern, pre and post cancer detection were obtained.

Ethical consideration

This study was approved by the Food Service Department of the Tata Memorial Hospital, which has experts on its board. Valuable suggestions were given by the department which were considered and followed accordingly.

Data analysis

The data was coded and entered in the excel sheets. It was analyzed using the statistical package for the social sciences (SPSS) version 22.0. The statistical tests include the mean, standard deviation, t test, Pearson's value of significance etc.

Results and discussions

Of the 100 participants, 60 were males and 40 were females. Among the participants, 60 were residents of urban regions, 27 resided in rural areas and the rest 13 participants hailed from towns or semi- urban regions. There were 21 participants who fell in the age category of 25-44 years and 79 participants were under the age category of 45-60 years.

The anthropometric measures of the participants were also taken. According to the World Health Organization, BMI Standards, for Asians (2013), the mean BMI of Males and females were 23.0 ± 5.42 and 23.7± 6.45Kg/m^2 respectively which were categorized as overweight. The MUAC and CC was under the normal range for both, men as well as women participants. Similar results were found by Muscaritoli et al., (2017), among 1952 cancer patients, whose mean BMI was 24.8±4.4 Kg/m^2.

Among the 100 participants in the current study, it was found that, 12 males were involved with business and 7 subjects (2 females and 5 males) were into farming as

their profession. We also reported that 24 females and 7 males were home makers and19 (4 females and 15 males) were retired. There were a total of 18 subjects, majorly males (13 males), who were involved in providing different services as their professional curriculum. There were about 2 male students who were also a part of this study. The profession of the subjects across the gender categories was found to be significant (p=0.005).

After dietary analysis, in our study, we found that pre dietary intervention, 70 patients started consuming fruits daily and of them 28 had 2 fruits per day and 37could include one fruit per day. Pre intervention, 62 participants had started incorporating fruit juices on a daily basis in their dietary schedule. Coconut-water was a part of 49 subject's dietary habits; of them majority (41 subjects) relished a glass of coconut water daily. Post cancer detection and pre intervention, 35 participants started incorporating vegetables in their daily meals and 3 participants discontinued vegetable intake. Among the participants who started consuming vegetables, 21 of them had 2 bowls of vegetables and 9 participants consumed 3 bowls of vegetables. Maunsell et al. (2013) also found an increase in fruit and vegetable intake (72%) after diagnosis, among 250 newly diagnosed breast cancer patients.

In our study, 24 patients started consuming nuts and dried fruits, which included almonds, cashew nuts, pistachio, dates and dry figs. Pre dietary intervention (counselling and supplementation),of all the patients, only 44 participants consumed milk daily, while 19 patients stopped consuming milk. Those who stopped milk consumption reported to have diarrhea and or gas/bloating symptoms or were influenced by their neighbor's/ friend's advice. Twenty-seven subjects were found to incorporate bakery products like biscuits, bread, khari, toast etc., in their diet, prior to the nutritional intervention. Bakery products might be preferred by the participants due to its easy availability and taste preferences. Ten subjects discontinued biscuits and bakery product intake, post cancer detection. Nordevangand his co researchers reported (1992)that there was a significant reduction in the total intake of milk products, cakes, and the consumption of vegetables, fruits, cereals and fish increased ($P \leq 0.01$), among 240 cancer patients, who did not receive the dietary intervention.

Among the 100 participants in the current study, 22 of them were vegetarian in dietary habits, 76 were non vegetarian and 2 of them were ovo-vegetarian. Thirty-six subjects introduced egg in their dining schedule. A total of 34 participants stopped fish consumption, 31subjects discontinued the chicken intake and 35 participants gave up meat consumption, pre intervention. Similar results were found in a study conducted by Blanchard et al., (2003), on 352 adult cancer patients. Of them, 151 (42.9%) participants

reduced their red meat intake, post cancer detection.

Out of 25 patients who used to take tobacco, it was found to be discontinued by 20 patients, post disease detection, in our study. Similarly, out of the 22 patients who used to smoke, 18 patients quit smoking. And from 21 patients who consumed alcohol, 20 patients dropped alcohol consumption after the disease detection. Steinhilper et al. (2013), revealed that 73 % of the population who smoked did not reduced their nicotine intake, but only 17 % reported a reduction or cessation, in his study on 229 women (age < 70) in Germany.

Junk foods such as vadapav, samosa, pizza, chart, Chinese cuisines, Italian cuisines etc, were eliminated by 34 subjects in our study, and added by 3 subjects in their meals, pre dietary intervention. Two participants reduced the consumption of junk foods.Sweetsand desserts were eliminated by 35 subjects, and reduced by only 1 subject, before nutritional counseling. It was also found that 6 patients added sweets and desserts in their dietary schedule post cancer detection. Changes in health behavior were studied by Steinhilper et al., (2013), on 229 women (age < 70) in Germany. Their study stated that 39 % of their study population had lower snack intake and 45 % had higher snack intake pre diagnosis which changed post detection.

We also reported changes in the dietary consumption patterns in the two age group categories (25-44 years and 45-60 years) and the gender categories (females and males). It was found that 70 % of males and 75 % females started consuming fruits post cancer detection and pre dietary intervention which was found to be significant (p=0.04). On inquiring the participants, it was found that they incorporated fruit/ vegetable juice as well as coconut water due to its cancer curing properties as put across on the internet. But the participants were unaware of the total carbohydrate consumption through fruit/ vegetable juices. Fructose can play a central role in the development of the metabolic syndrome linked to the development of diabetes, inflammation, and lipogenesis (Charrez et al., 2015). Fructose is also found to increase gut permeability and endotoxin release. Moreover, fructose hampers the mitochondrial function, increases the pro-inflammatory cytokine release, affects insulin signaling and leads to DNA damage. Fructose is also found to be linked with hepatocellular carcinoma, colon and pancreas cancers (Charrez et al., 2015). Satia et al., (2004), found non-statistically significant increase in fruit/juice intake (0.1 serving) ($P< 0.05$) among 278 colon cancer patients.

In the current study, it was seen that the amount of fruit/ vegetable juice and the eggs consumed by the younger participants (25-44 years) was higher compared to the older participants (45-60 years), but only fruit juice intake was found to be significant (p=0.00).

Also, the dietary advice given by different individuals, in this study, were studied in the categories based on residential area. Fifty-six subjects, brought about dietary changes by themselves post cancer detection, and most of them were residents of urban areas (60.0 %). It was found that 17 subjects brought about changes in their dietary pattern on the guidance of the family and relatives and higher percent of semi-urban residents (23.1%), were influenced by the family and relative guidance. Twenty percent subjects were advised by the doctors to make changes in their meals. Internet also influenced urban participants (6.7%) to bring about dietary changes. And 11.1% of rural participants made the changes in their food patterns, by the influence of their friends and neighbors. Advice given by different individuals were found to be significantly related (p=0.04) across the participants residing in the different areas. The changes in the food patterns were found to be willingly practiced by 84 subjects, while for the rest, accepted the changes in their dietary patterns forcefully. Blanchard et al., (2003) found that 99 out of 352 cancer (28%) participants reduced their fat intake, 86 (24%) increased their fiber intake, and 54 (15.3%) reduced their red meat intake, on the recommendations from their physician.

Table No. 1 shows the impact of cancer detection and its treatment on the professional life of the subjects, based on the age and gender categories.

Similarly, Dueñas et al., (2015), studied 1957 patients, and they found that more than 50% reported to have limitations in their daily activities, 24.4% of subjects who experienced pain/ related symptoms, had requested sick leave and 12% had left or lost their job.

Table No. 1: Impact of cancer detection and its treatment on the professional life of the subjects, based on the age and gender categories:

Subjects post cancer detection	Age Categories		N	p	Gender		N	p
	25 - 44y (N=21)	45 - 60y (N=79)			Female (N=40)	Male (N=60)		
No. of subjects who quit their profession	3 (14.3%)	13 (16.5%)	16	0.26	2 (5.0%)	14 (23.3%)	16	0.005
No. of subjects who took a leave from their profession	7 (33.3%)	24 (30.4%)	31		9 (22.5%)	22 (36.7%)	31	
No. of subjects who opted work from home	1 (4.8%)	0 (0%)	1		1 (2.5%)	0 (0.0%)	1	
No. of subjects who were not affected professionally	10 (47.6%)	42 (53.2%)	52		28 (70.0%)	24 (40.0%)	52	

Pre cancer detection, 8 subjects stepped outside their house once a week and 62 subjects moved out of their houses on a daily basis. About 16 participants scheduled to move out on a twice- thrice a week, while the rest 14 subjects moved out of their houses rarely. Post-disease detection, it was found that 51% of patients skipped all the family functions and social gatherings. Thirty percent of the patients skipped just 1-2 functions and social gatherings, and 10 % of the patients skipped 5-6 functions after the disease was detected. Seven percent of the patients were not affected by the disease detection and hence were a part of most/ all of the social gatherings. Two patients could not make it to 10-12 functions after the disease was detected. Similar results were found by Fleshner and Herschorn (1996)in a study done on 30 men post radical prostatectomy, where they reported some impairment of the daily activities along with diminished ability to socialize with friends.

In the current study, post cancer detection, walking and or jogging was discontinued by 44 participants due to their physical inability, symptoms or due to the treatment course. Similarly,46 participants were unable to continue the household chores and 15 participants discontinued the outdoor sports. Also, there were a few (14 participants) who stopped playing cards or carom with friends and 25 participants stopped going out with their friends, post cancer detection. Nineteen participants didn't discontinue any of the activities after the cancer detection. Demark and Wahnefried et al. (2000), found that 58% subjects reported regular exercise (defined as ≥ 30 mins on ≥ 3 days per week) among 531 subjects with early stage of breast cancer and 447 subjects with prostate cancer.

In our study, post nutritional intervention, only 20 participants turned up for the follow up, in the span of 22-35 days. Their subjective global assessment (SGA) score, weight and body surface area (BSA), were compared pre and post nutritional intervention, improved significantly ($p = 0.02$). There was mild drop in the mean weight after the nutritional counselling, which was seen among the participants. The mean BSA values were found to be similar pre and post nutritional intervention. Both, the mean weight and the mean BSA, pre and post nutritional intervention, were not found to be significant. Similar results were found in a study by Ravasco (2005), where he found that dietary intervention improved the SGA scores of previously malnourished cancer patients, showing a net average recovery of 4 (2-7) kg at the 3 months follow-up.

Our study also found that the dietary compliance of the participants increased significantly ($p=0.02$), post intervention. The mean total energy intake of the subjects also increased. However, there was a slight drop in the mean protein intake. But total energy and protein intake were not found to be

significant. Nutritional intervention led to a significantly higher daily energy and protein consumption at a significance level of P¼=0.007 (+ 379 kcal) and P¼= 0.016 (10.4 g), respectively, in a study conducted by Uster et al (2013), among 30 cancer patients.

The biochemical parameters of the participants in our study were also recorded pre and post dietary intervention. The hemoglobin, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, serum sodium and serum potassium were found to be same pre and post dietary intervention. The mean albumin was not found to increase significantly. The mean creatinine level and the mean uric acid levels were significantly found to decrease post intervention (p= 0.01), (p= 0.004), respectively. The mean globulin levels were found to decrease significantly (p=0.01) to normal range (3.12 ± 1.16 g/dL), post dietary intervention. The mean fasting glucose was also found to reduce to normal range (91.00 ± 7.93 mg/dL) from the deranged level (109.67 ± 17.78 mg/dL), but was not found to be significant. Imamuraet al., (2016), found the dietary compliance to be 68.7±30.4% (median 81.2%) among 112 cancer patients but there was no significant differences in the nutrition-related blood parameters. Also, another study by Smith et al., (2006), showed that those participants who received dietary intervention, were found to have a lower level of fasting blood sugar, compared to the participants who did not receive the dietary intervention. However, this was not found to be significant in their study (p=0.94). Thus, concluding that dietary intervention plays a critical role in altering the biochemical parameters positively.

Conclusion

Cancer detection itself impacts the food choices, professional and the social life of the individuals, which might have a prognostic impact on the cancer. An early clinical and dietary intervention, may help in improving the healthy food choices and can have a positive impact on the physical activity pattern, as well as professional and social life.

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