

ORIGINAL ARTICLE

Association between Self-Esteem and Dietary Changes among Cancer Patients: A Cross-Sectional Study

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ABSTRACT

Introduction: Cancer diagnosis may shift an individual's food choices as well as self-esteem mainly due to the side effects of treatment, which will influence their nutritional status and perception about themselves. The aim of this study was to explore the association between dietary changes and self-esteem among cancer patients. **Methods:** A cross-sectional study was conducted among 113 cancer patients in Hospital Universiti Sains Malaysia. Among the data collected were socio-demographic background, clinical characteristics, Karnofsky Performance Status Scale, dietary changes questionnaire before and after cancer diagnosis, self-esteem. Spearman correlation was employed for determining the relationship between dietary changes and self-esteem. **Results:** Out of 113 subjects, 98 subjects (86.7%) made changes in their dietary intake after being diagnosed with cancer. A total of 58.4% and 45.1% of the subjects reported a decrease in their intake of sugar and condensed milk, while 52.2% stopped consuming red meat. The mean self-esteem score was reported to be average (29.33 ± 3.52). However, no statistically significant association was found between socio-demographic, clinical parameters, and self-esteem with dietary changes. **Conclusion:** The findings of this study demonstrated that cancer patients had made drastic dietary changes following cancer diagnosis especially consumption of red meat and food high in sugar. Most cancer patients had average self-esteem level. Although no association had been found between dietary changes and self-esteem level, it is suggested for more studies should be carried out to provide clear understanding of the factors affecting dietary changes among cancer patients.

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INTRODUCTION

Cancer is a group of diseases that can impact any part of the body which are also known as malignant tumors and neoplasms (1). Abnormal growth of cells which further divide and reproduce throughout the body is due to cancer that may lead to death (1,2). Globally, up to 19,292,789 new cancer cases and 50,550,287 prevalent cancer cases are reported in 2020. Out of 7.8 billion of people in the world, the number of deaths due to cancer is estimated nearly 10 million cases (3). According to the Malaysia National Cancer Registry Report, from 2012 to 2016, new cancer cases had been reported were a total of 115,238 cases in which 44.7% of the cases were among males while 55.3% were among females (4). Breast, colorectal, lung, lymphoma, nasopharynx, leukemia, prostate, liver, cervix uteri and ovary were the ten most common cancers among Malaysian in 2012-2016 (4).

Change in food intake and/or diet preference can be influenced by cancer (5). Cancer diagnosis plays a significant role in affecting patients' dietary habits. Studies have been done among breast cancer patients in Slovenia, Australia and Finland which reported up to 68.6%, 39% and 30% of patients, respectively who changed their dietary intake following cancer diagnosis (6-7). Poor choice of food intake is one of the determinants of breast cancer recurrence and mortality (8). Cooking methods influence cancer risk in which a study among breast cancer women in Turkey has found breast cancer risk is increased among those who consume red meat which have been deep fried instead of stewed (8). Meanwhile, a study on dietary changes among Malay breast and gynecological cancer survivors found that the reasons for dietary modifications made were due to side effects from the treatment, worry of cancer recurrence and risk of getting non-communicable disease (9). The current studies available on dietary changes were only highlighting breast cancer patients and breast or gynecological cancer survivors (9-11).

Cancer patients are often seen having many side effects that can affect their quality of life, nutritional status,

sleep quality, psychological distress as well as their self-esteem (12-17). Cancer diagnosis may negatively affect patients' perception on their bodies which may lead to shifts in their level of self-esteem (18-19). Low self-esteem among cancer patients may lead to depression and disrupt social relationships resulting in poor social support. Besides that, self-esteem is lower among young cancer patients especially cancer of breast, ovary, cervical and prostate due to long term consequences affecting virility or femininity such as fertility issues and sexual dysfunction (20). Cancer treatment such as neoadjuvant chemotherapy that is done to decrease cancer cells or shrink existing tumors is one of the factors for low self-esteem among cancer patients as patients who undergo this type of treatment may experience decline in limbs function, hair loss, skin, and nails changes, and feel embarrassed of their own bodies (12). As patients may experience low self-esteem due to side effects from the treatments, patients may not adhere to the treatment well (19). Non-adherence to treatment also includes specific diet recommended for cancer patients which may lead to poor prognosis, lower quality of life, longer hospital stay and increased mortality (21). Thus, it is crucial for healthcare workers such as medical professionals or nursing staff to have good relationship with patients to enhance patients' self-esteem and ensure patients' compliance to their treatments (19). We aimed to investigate whether dietary changes would also be associated with patients' self-esteem which will improve current knowledge as well as enhance cancer patients' care management as there has been no study conducted that identify the association between dietary changes and self-esteem of cancer patients. Therefore, in the present study, we determined the association between dietary changes and self-esteem among cancer patients.

MATERIALS AND METHODS

Study population and recruitment procedure

This cross-sectional study enrolled 113 cancer patients. Patients were voluntarily recruited using convenience sampling method. Eligible patients were included if they met the following inclusion criteria: aged 18 years old and above with any types of cancer, patients in either outpatient or inpatient setting, undergo chemotherapy and/or radiotherapy treatment and/or surgery or without undergoing treatment, Karnofsky Performance Status Scale Score of $\geq 50\%$ and able to understand Malay and/or English. Patients were chosen from both the inpatient and outpatient settings to meet the sample size of the study. Patients were excluded from this study if they met the exclusion criteria: acute medical concern or cognitive impairment defined by medical staffs, pregnant cancer women or cancer survivors, receiving hematopoietic cell transplant, require palliative care, isolation, or ventilation, bedridden patients, in intensive care unit (ICU) setting, pediatric patients or with serious hearing or vision problem. Informed consent has been obtained from each participant before recruiting them in

the study. This study has obtained ethical approval from the Universiti Sains Malaysia Research Ethics Committee with approval number USM/JPEM/21060458.

Data collection

Data collection was carried out through interview-administered questionnaires by the researcher. The data collection form consisted of sociodemographic data on age, gender, ethnicity, marital status, education, occupation and income; clinical data which included date of admission, medical diagnoses, duration of diagnosis, stage of cancer and type of cancer treatment; Karnofsky Performance Status Scale to assess cancer patients' functional capacity level; dietary changes questionnaire that was used to determine subjects' dietary changes before diagnosis and after diagnosis and the Rosenberg Self-Esteem Scale questionnaire to assess subjects' self-esteem.

The questionnaire was used by Nadzirah et al. (2020) to determine changes in dietary intake made among Malay breast and gynaecological cancer survivors in Malaysia (9). The questionnaire has been adapted and modified according to Women's Healthy Eating and Living Study (WHEL) and a study which was to discover the dietary changes made by breast cancer patients (11). The questionnaire consists of two categories which are 17 items for sources of food and six items for types of cooking methods. Subjects need to choose one answer from four choices to indicate their current dietary habit after being diagnosed with cancer whether "increased", "decreased", "no changes" or "stop consumed" and also whether they consumed the food before cancer diagnosis. Positive dietary modification was considered when subjects report any increase intake of fruits, vegetables, fish, milk, cheese, legumes, soy and beans, whereas decrease or no intake of red meat, salt, sugar, sweetened condensed milk, condiments and coconut milk were also viewed as positive changes (9). For cooking method, increase in practising stir frying, grilling, steaming and boiling were considered positive changes as they were low-fat cooking methods. Positive changes were scored as one point (+1) while negative changes were scored zero (0) which were changes that were opposite the positive dietary modification stated above. Total positive scores were summed up and the higher the score, the better the dietary changes following cancer diagnosis (9).

The Rosenberg Self-Esteem Scale (RSES) is a widely used questionnaire to assess self-esteem which measures both positive and negative feelings about oneself (22-23). A validated Malay version of RSES was used in this study which was validated among Malaysians in Kuala Lumpur with Cronbach alpha of 0.72 (22). This questionnaire consists of ten items scale with four-point Likert scale which are "strongly agree", "agree", "disagree" and "strongly disagree". Mean of all items were calculated with scoring of one point for "strongly disagree", two

points for “disagree”, three points for “agree” and four points for “strongly agree” for all items except for item 2, 5, 6, 8 and 9 which needs to be reverse scored. Subjects with higher scores were signified higher self-esteem (24-25). The self-esteem score is categorized according to three categories which are high (satisfactory) when total self-esteem score is above 30 points, average when score is between 20 to 30 points and low (unsatisfactory) when score is less than 20 points (13,19).

All statistical analysis were performed using Statistical Package for Social Sciences (SPSS), version 26.0. Descriptive analysis was used to summarize the sociodemographic, clinical data, self-esteem, and dietary changes of the subjects. According to the normality distribution, numerical data was presented as mean with standard deviation (SD) or median with interquartile range (IQR) while categorical data was presented as frequency and percentage (%). The association of self-esteem and dietary changes among cancer patients was tested using Spearman’s Correlation. Meanwhile, the association between sociodemographic factors and clinical parameters with dietary changes were assessed using Mann Whitney and Kruskal Wallis tests. The significance level of the statistical test was set at a p-value of less than 0.05.

RESULTS

Out of 113 subjects, 76 subjects (67.3%) were females and majority of the subjects were from Malay ethnicity (97.3%). A total of 44.2% of the cancer patients were above the age of 50 years old, married (77.9%), with tertiary education level (45.1%) and without salary (67.3%). Meanwhile, 90 of them (79.6%) had Karnofsky Performance Status Scale between 80 to 100% which indicates good functional status. A total of 73 subjects (64.6%) were inpatients. The most common cancer was breast cancer (23.9%) followed by lymphoma (13.3%) and gynaecological cancer (11.5%). Respondents were predominantly being diagnosed with cancer for less than 1 year (67.3%). Chemotherapy treatment alone was the common treatment identified among the respondents which comprises of 42 subjects (37.2%) and a total of 37 subjects (32.7%) were in stage IV. The self-esteem score for the population was reported to be average with mean and standard deviation of 29.35 ± 3.55 (Table I).

As for the dietary changes, 58.4% and 45.1% of the patients reported to have decreased intake of sugar and sweetened condensed milk. Red meat intake reduction was also observed among 31.0% of the patients and 52.2% of the patients stopped consuming red meat. Soy product and nuts consumption was stopped by 35.7% and 33.0% of the patients. Food that showed increased consumption were milk (28.3%), cruciferous vegetables (12.4%), fruity vegetables (11.5%), and green leafy vegetables (11.5%). At least 23.0% of patients reduced the intake of deep-fried food, but 39.8% increased

Table I: Socio-demographic and clinical data of subjects (N = 113)

Variables	Frequency (n)	Percentage (%)
Gender		
Male	37	32.7
Female	76	67.3
Age		
18 – 30 years	26	23.0
31 – 40 years	15	13.3
41 – 50 years	22	19.5
> 50 years	50	44.2
Ethnicity		
Malay	110	97.3
Chinese	1	0.9
Others	2	1.8
Marital Status		
Single	20	17.7
Married	88	77.9
Divorced	5	4.4
Educational Status		
Primary	11	9.7
Secondary	50	44.2
Tertiary	51	45.1
None	1	0.9
Income (RM) per month		
< RM 2500	17	15.0
RM 2500 - 4999	10	8.8
RM 5000 - 10000	10	8.8
No salary	76	67.3
Karnofsky Performance Status Scale		
50 – 70%	23	20.4
80 – 100%	90	79.6
Hospitalization		
Inpatient	73	64.6
Outpatient	40	35.4
Tumour localization		
Colorectal	11	9.7
Breast	27	23.9
Lymphoma	15	13.3
Leukaemia	11	9.7
Bone	3	2.7
Brain	2	1.8
Lung	4	3.5
Head and neck	1	0.9
Gynaecological	13	11.5
Multiple myeloma	5	4.4
Nerve	1	0.9
Myelodysplastic syndrome	2	1.8
Soft tissue	4	3.5
Testicular	5	4.4
Nasopharyngeal	5	4.4
Prostate	2	1.8
Mediastinal GCT	1	0.9
Skin	1	0.9
Duration of cancer		
< 1 year	76	67.3
1 – 5 years	29	25.7
6 – 10 years	5	4.4
11 – 15 years	1	0.9
> 15 years	2	1.8
Treatment		
Chemotherapy	42	37.2
Radiotherapy	1	0.9
Radiotherapy + chemotherapy	14	12.4
Concomitant radio chemotherapy (CCRT)	3	2.7
Surgery	3	2.7
Surgery + chemotherapy	22	19.5
Surgery + radiotherapy	1	0.9
Surgery + radiotherapy + chemotherapy	11	9.7
Radiotherapy + chemotherapy + brachytherapy	2	1.8
Chemotherapy + brachytherapy	2	1.8
Radiotherapy + brachytherapy	1	0.9
CCRT + brachytherapy	3	2.7
Without treatment	8	7.1
Stage of cancer		
Stage I	2	1.8
Stage II	17	15.0
Stage III	23	20.4
Stage IV	37	32.7
Unknown	34	30.1
Self-esteem score		
Mean ± SD	29.35 ± 3.55	

Abbreviations: RM: Malaysian Ringgit; GCT: Germ cell tumour; SD: standard deviation

consumption of steaming cooking method (Table II).

Overall, no significant difference was found between the median dietary changes scores and all socio-demographic and clinical parameters (Table III). Furthermore, it was found that there is no significant relationship between self-esteem and dietary changes among cancer patients in Hospital USM ($r = 0.108$, $p > 0.001$, $n = 113$) (Table IV).

DISCUSSION

The current study shows that the prevalence of cancer was higher among females compared to males as more females were recruited. This was in line with the finding by The Global Cancer Observatory in 2020 which reported that in Malaysia, females had high number of cancer cases than males with number of new cases in 2020 were 25,587 cases for females and 23,052 cases for males (3). Furthermore, patients aged 50 years and above was the major age group recruited in this study which was in accordance with a study among cervical cancer patients that found the diagnosis of cancer increased with age (26). This can be explained by the decline in gene repair activity with increased genetic instability that causes increased spreading of tumor in ageing population (27). Moreover, in the current study, the respondents' educational background was mostly from the secondary and tertiary levels. Patients with higher educational status will seek medical treatment due to increased awareness and access to health care, thus explaining why the present study consisted of patients with good educational background (28). Meanwhile, the common anti-cancer treatment received by respondents in this study was chemotherapy. Chemotherapy was

Table III: Association between socio-demographic, and clinical parameters with dietary changes

Variables	Dietary Changes Median (IQR)	p-value
Gender^a		
Male	28.26 (22)	0.569
Female	26.09 (17)	
Age^b		
18 – 30 years	17.39 (26)	0.248
31 – 40 years	30.43 (35)	
41 – 50 years	23.91 (17)	
> 50 years	26.09 (17)	
Marital Status^a		
Married	26.09 (17)	0.108
Non-married	21.74 (28)	
Educational Status^b		
Primary	30.43 (28)	0.602
Secondary	21.74 (22)	
Tertiary	26.09 (17)	
Income (RM) per month^a		
Has salary	26.09 (17)	0.338
No salary	23.91 (22)	
Hospitalization^a		
Inpatient	26.09 (21)	0.349
Outpatient	21.74 (22)	
Duration of cancer^a		
< 1 year	26.09 (22)	0.606
> 1 year	21.74 (22)	
Stage of cancer^b		
Stage I	26.09	0.644
Stage II	21.74 (13)	
Stage III	30.43 (23)	
Stage IV	26.09 (23)	
Unknown	26.09 (26)	

In all of the analysis, p value of < 0.05 was considered as significant. ^aMann-Whitney test; ^bKruskal Wallis test
Abbreviation: IQR: interquartile range

known to promote good prognosis in cancer patients as it may help to improve patients' survival but may be immunocompromising and caused multiple side effects (29). However, low self-esteem was known to be the usual consequence of long-term cancer treatment as

Table II: Dietary changes of subjects (N = 113)

Food/cooking methods	Pre-diagnosis consumption n (%)	Changes after cancer diagnosis (N = 113)			
		Increase n (%)	Decrease n (%)	No changes n (%)	Stop consumed n (%)
Median score		26.09 (22)			
Food					
Fish ^a					
Red meat ^b	113 (100.0)	19 (16.8)	21 (18.6)	72 (63.7)	1 (0.9)
Nuts and legumes ^a	108 (95.6)	1 (0.9)	35 (31.0)	18 (15.9)	59 (52.2)
Soy products ^a	99 (87.6)	2 (1.8)	16 (14.3)	57 (50.9)	37 (33.0)
Tropical fruits ^a	90 (79.6)	1 (0.9)	13 (11.6)	58 (51.8)	40 (35.7)
Non-tropical fruits ^a	112 (99.1)	10 (8.8)	9 (8.0)	92 (81.4)	2 (1.8)
Beans vegetables ^a	112 (99.1)	10 (8.8)	6 (5.3)	95 (84.1)	2 (1.8)
Green leafy vegetable ^a	106 (93.8)	11 (9.7)	17 (15.0)	65 (57.5)	20 (17.7)
Cruciferous vegetable ^a	111 (98.2)	13 (11.5)	10 (8.8)	89 (78.8)	1 (0.9)
Fruity vegetable ^a	111 (98.2)	14 (12.4)	13 (11.5)	82 (72.6)	4 (3.5)
Milk ^a	108 (95.6)	13 (11.5)	11 (9.7)	84 (74.3)	5 (4.4)
Cheese ^a	83 (73.5)	32 (28.3)	8 (7.1)	55 (48.7)	18 (15.9)
Salt ^b	85 (75.9)	1 (0.9)	13 (11.6)	69 (61.6)	29 (25.9)
Sugar ^b	113 (100.0)	0 (0.0)	29 (25.7)	84 (74.3)	0 (0.0)
Sweetened condensed milk ^b	113 (100.0)	1 (0.9)	66 (58.4)	42 (37.2)	4 (3.5)
Seasoning ^b	111 (98.2)	2 (1.8)	51 (45.1)	39 (34.5)	21 (18.6)
Coconut milk ^b	108 (95.6)	0 (0.0)	37 (32.7)	56 (49.6)	20 (17.7)
	113 (100.0)	0 (0.0)	23 (20.4)	89 (78.8)	1 (0.9)
Cooking method					
Deep frying ^b	112 (99.1)	5 (4.4)	26 (23.0)	80 (70.8)	2 (1.8)
Stir frying ^a	110 (98.2)	12 (10.7)	11 (9.8)	86 (76.8)	3 (2.7)
Grilling/barbecuing ^b	110 (97.3)	25 (22.1)	17 (15.0)	61 (54.0)	10 (8.8)
Roasting ^a	107 (95.5)	19 (17.0)	16 (14.3)	54 (48.2)	23 (20.5)
Boiling ^a	112 (99.1)	48 (42.5)	8 (7.1)	54 (47.8)	3 (2.7)
Steaming ^a	111 (98.2)	45 (39.8)	9 (8.0)	54 (47.8)	5 (4.4)

^a Positive change by increase intake; ^b Positive changes by decrease or stop consumed

Table IV: Association between self-esteem with dietary changes

Total dietary changes score	Self-esteem score	
	Correlation coefficient (<i>r</i>)	<i>p</i> -value ^a
	0.108	0.289

^aSpearman's correlation coefficient

it may influence patients' perception of themselves (30). The present study had 42 respondents receiving chemotherapy and the mean self-esteem score of our study was 29.35 ± 3.55 which is classified as average self-esteem score whereas a previous study discovered lower mean self-esteem score of 22.67 ± 4.98 among 953 cancer patients receiving chemotherapy (18). They concluded that cancer patients undergoing chemotherapy had low to moderate level of self-esteem. This study presented the dietary changes made by cancer patients in Hospital USM following cancer diagnosis showed that 86.7% of the subjects ($n = 98$) modified their food intake. There was no increase intake of any food among the subjects such as vegetables or fruits, but significant reduction was seen in red meat, sugar and sweetened condensed milk consumption. In the past studies on dietary changes among breast cancer patients, consumption of fruits, vegetables, fish, low-fat milk, and soy products were observed to be increased among their subjects after being diagnosed with cancer (9-11). Common causes of their dietary changes were due to advice from dietitian or doctor and their willingness to treat their cancer (11). Moreover, consumption of fruits and vegetables were highly dependent on several factors such as socio-economic status, living in urban area, married and household income not less than RM 3,500 which were in contrast with the respondents in the current study that majorly had no salary although mostly were married (31).

Furthermore, our result discovered substantial changes in meat consumption as 52.2% ($n = 59$) of the respondents stopped consuming red meat while 31.0% ($n = 35$) decreased their red meat intake which were categorized as positive changes. The common reason for the changes was due to patients' fear and belief that red meat may cause cancer cell reactivation. This was also discovered by previous study among breast and gynaecological cancer survivors in which 42.9% ($n = 33$) had reduced and 40.3% ($n = 31$) had stopped consumption of red meat due to belief of risk of cancer recurrence will be increased and cancer cell will be reactivated (9).

The current study also demonstrated decreased consumption of sugar ($n = 66$) and sweetened condensed milk ($n = 51$) which were also categorized as positive changes made by the subjects in this study following cancer diagnosis. These findings were consistent with previous studies that also observed reduction in sugar intake (9,10, 32). This dietary change was in accordance with the recommendation by the World Cancer Research Fund/American Institute for Cancer Research

that recommended limiting consumption of sugar which included snacks, bakery foods, desserts, and candy and sugar added in sweetened beverages. High sugar intake may cause weight gain which may lead to overweight or obesity that comes together with increased body fat and may lead to cancer and other non-communicable diseases (33). This opposed the misconception that sugar can cause development of cancer cells due to belief that sugar can feed the cells (9). Nonetheless, studies had proven that sugar may cause impairment in glucose and insulin tolerance that will promote carcinogenesis if sugar was taken excessively and habitually (34). In terms of cooking method, most of the respondents in this study did not change the cooking methods. The findings of this study were inconsistent with other previous studies which found that boiling cooking method was increased whereas fried cooking method was reduced (9,11).

There were several factors that influence dietary modification among cancer patients. A meta-analysis was consistent with dietary change that was driven by taste and smell changes which were the common side effects after receiving chemotherapy (35). As the current study comprises of 37.2% receiving chemotherapy treatment, thus changes in taste and appetite due to nausea, dry mouth, food aversion and chewing problem as side effects from the treatment may influence choices of food intake (36). Furthermore, a study conducted in Klang Valley, Malaysia discovered positive correlation between grocery shopping practices with diet quality among Malaysians (37). Choices of groceries was influenced by household income and educational level as higher educational level was linked with higher income and good knowledge on healthy eating (37). However, the current study shows that 45.1% of the respondents had tertiary education level whereas 67.3% had no salary. As the percentage of respondents without salary was higher, this may be one of the main contributing factors why no changes were observed in fruits and vegetables intake and other food choices that should be expected to increase. This explanation was also supported by a study carried out among 2820 Malaysian adults that showed adults with higher income consumed adequate consumption of fruits and vegetables that was assumed to be caused by the affordable price of fruits and vegetables by those with high socio-economic status (31).

The mean total score of self-esteem from this study was 29.35 ± 3.55 . Compared to previous studies among cancer patients in Malaysia, the mean total score of self-esteem were 22.67 ± 4.98 (18), 24.41 ± 7.02 (24) and 24.59 ± 7.00 (38). The current study showed higher mean self-esteem score in contrast with other studies although far from the maximum score which is 40. However, the past studies conducted did not identify the association of self-esteem with dietary changes. The current study showed no significant relationship between self-esteem and dietary changes among cancer

patients in Hospital USM ($r = 0.108$, $p = 0.289$, $p > 0.001$). This is because dietary changes among cancer patients are not dependent on self-esteem alone but are influenced by several other factors such as side effects of cancer treatment, medication taken, and information obtained from others. Self-esteem of cancer patients was explained to be influenced by cancer diagnosis itself and patients' course of treatment (12, 18, 19).

Previous studies have discovered that level of self-esteem was significantly associated with age, gender, marital status, education level and income status, overall quality of life, nausea, vomiting, anxiety, depression, anaemia, hair loss and skin and nail changes (18; 38). These factors may influence patients' dietary intake. A recent study among women with breast cancer during chemotherapy explained that chemotherapy will cause increment in body weight with a mean of 2.7 kg which will negatively influence patients' self-esteem (35). Changes in body weight will cause change in lifestyle factors that includes daily dietary intake (36). Thus, this demonstrated the indirect interrelation between self-esteem and patients' dietary changes. However, further studies are required to provide clearer understanding on the association of self-esteem with dietary changes.

There were several limitations in this study. Firstly, this study focused on all types of cancer patients which reduced the ability to detect the dietary changes among specific group of cancer patients. Next, the dietary changes questionnaire was not validated among different group of cancer patients due to limited sample size of patients for each type of cancer.

CONCLUSION

In conclusion, the results of this study demonstrated that majority of the cancer patients in this study changed their dietary intake after being diagnosed with cancer. Positive dietary changes observed were decreasing the consumption of red meat, sugar, and sweetened condensed and deep-fried food, while increasing the intake of milk, cruciferous vegetables, green leafy vegetables and fruity vegetables. Moreover, the self-esteem level of the cancer patients in this study were average which was almost similar to previous studies (29.35 ± 3.55). The present study concludes that there was no significant association between socio-demographic, and clinical parameters with dietary changes among cancer patients. It was also found that there was no significant relationship between self-esteem and dietary changes among the subjects. Future studies must focus on conducting this research among specific group of cancer patients by employing longitudinal study design.

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