ORIGINAL

Relationship between Nutritional Status and Quality of Life in Gastrointestinal Cancer Patients on Chemotherapy

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ABSTRACT ***Background and purpose***. Malnutrition occurs frequently among cancer patients, especially those who having GI cancer and receiving chemotherapy. This condition obviously affects to patient's QoL. This study aimed to determine relationships between nutritional status and QoL in GI cancer patients receiving chemotherapy. ***Method.*** This cross-sectional study was conducted among 65 patients in HMUH from 2016 to 2018. BMI, PG-SGA, Albumin and the EORTC QLQ –C30 was used to assess. ***Results.*** The rate of underweight was higher in gastric cancer than colorectal cancer patients, 50.0% and 27.6% respectively (p<0.05). Malnourishment rate was significantly higher in gastric cancer patients with 97.2% in comparing with 62.1% colorectal cancer patients (p<0.0001). Among 65 patients, 23.1% patients had low Albumin (<35g/dL). Global score, emotional functioning score were lower and fatigue score was higher in malnourishment or underweight groups (p<0.05). Patients at risk of malnourishment had significantly lower score of physical functioning (p=0.005) and higher score of nausea and vomiting (p=0.01), pain (p=0.0001), appetite loss (p=0.047). Additionally, as PG-SGA score increased, fatigue, appetite loss and pain symptoms increased (r=0.59 0.42 and 0.43 respectively) while global score decreased (r=-0.45) (p<0.005). The correlation of BMI with global score was positive (r=0.42, p<0.005), with fatigue and pain symptoms was negative (r= -0.25 and -0.27 respectively, p<0.005). ***Conclusion.*** The results showed that underweight patients or patients at risk of malnourishment had lower QoL than normal weight and well-nourished patients. Thus, nutritional interventions are essential to improve QoL of GI cancer patients receiving chemotherapy.

Keywords: nutritional status, quality of life, gastrointestinal cancer, chemotherapy

INTRODUCTION

Cancer incidence has been increased recently and was the second leading cause of death worldwide in 2015 (8.8 million deaths); while the third and fourth most common causes were colorectal and stomach cancer (774 000 and 754 000 deaths respectively) (1). In Vietnam, cancer is the second leading cause of death among non-communicable diseases (2).

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Abbreviations: GI = Gastrointestinal, HMUH = Hanoi Medical University Hospital, BMI= Body mass index, PG-SGA = The scored Patient-Generated Global Assessment, EORTC QLQ–C30=European Organization for Research and Treatment of Cancer Care Quality of Life Questionnaire

Cancer affects to nutritional status and QoL negatively due to the disease itself as a result of metabolic alterations, symptoms, and also because of treatment therapy's side effects. Most common symptoms of GI cancer and chemotherapy are anxiety, abdominal pain, weight loss as well as digestive problems such as appetite loss, heartburn, nausea, vomiting, indigestion, constipation and diarrhea. GI cancer patients on treatment therapy reported various negative effects on their nutrition and QoL such as fatigue, body image disturbance, eating restriction, digestive problems and neuropathy symptoms; these symptoms can persist long time after treatment (3,4). It is known about relationship between nutrition and risk of complications, hospital stay, recurrence, tre

-ment outcome and survival rate. Weight loss is common in patients on chemotherapy; it depends on cancer type and stage, arranged from 20% to 58% and up to 72% in advanced gastric cancer (5,6,7). Weight loss and low dietary intake cause higher malnutrition rate in GI cancer patients on chemotherapy, which is reported from 37.9% to 74.3% (8,9). A study in geriatric GI system cancer patients indicated that the malnutrition rate increased from 34.6% to 46.4% significantly with p=0.001 after one course of chemotherapy (8). The serum albumin level was significantly decreased after chemotherapy treatment and patients with hypo-albuminemia developed more severe chemotherapy-induced toxicity symptoms. That was a finding in a study of X. Wang and college (10). Moreover, albumin was demonstrated as a marker of prognosis of treatment outcome and mortality, higher serum albumin associated with better survival in cancer patients (11).

Patients who at risk of malnutrition reported significantly lower QoL than well nourishment in domains of global health, functioning, and symptoms (12, 13). These patients had lower global health, worse psychosocial issues like physical, emotional, cognitive and role functioning which belong to human being and suffered from more unwanted physical symptoms like nausea, vomiting, pain, fatigue.

Thus, the demand of screening malnutrition and management nutritional status, QoL of GI cancer patients undergoing chemotherapy increased, in order to implement nutritional intervention and also improve QoL. However, as the best knowledge, it was limited research in Vietnam about nutritional status of these patients on chemotherapy. For this reason, we conducted this study to find out the malnutrition rate and the relationship between nutritional status and QoL in GI cancer patients on chemotherapy.

MATERIALS AND METHODS

A cross-sectional study was carried out on GI cancer patients who receiving chemotherapy in HMUH, Vietnam from January 2016 to January 2018. The study conducted 65 patients above 17 years old with diagnose of gastric or colorectal cancer, who were receiving chemotherapy. Excluding criteria: patients have other diseases related cardiology, kidney diseases, liver diseases...The patients were voluntary to be asked and involved to this study, and were explained clearly about the goals and the approach of this study and signed in the consents. General information include age, sex. Weight and height were measured directly at point time of interview. PG-SGA and EORTC QLQ C30 were completed with face to face interview or self-completed the questionnaire. By using medical record with agreement of hospital director board, age, type and stage of cancer, albumin were investigated. The research was approved by medical ethic committee of Hanoi Medical University in 2016

Nutritional status: Nutritional status was assessed by BMI, scored PG-SGA and Albumin simultaneously.

The BMI was calculated from weight and height and classified into 3 groups (underweight: BMI<18.5 kg/m², normal weight: 18.5 – 24.9 kg/m², overweight: ≥ 25 kg/m²).

The scored PG-SGA, which is widely implemented and recommended in oncology clinical practice, was assessed. This scale includes patient-generated historical components, professional

components, and classified into three groups (A: well nourished, B: moderately malnourished or suspected malnutrition, C: severely malnourished). Three groups of Albumin include: normal rank is 35-50g/L; malnutrition is <30g/L

Quality of life (EORTC QLQ-C30) Participants' QoL was evaluated by Vietnamese version 3.0 of EORTC QLQ-C30. The EORTC QLQ-C30 is a questionnaire developed to assess the QoL of cancer patients worldwide (14,15). The questionnaire consists of four domains (global health, five functional scales, eight symptom scales and financial difficulties) with totally 30 questions. A low score of global health and functional scale, high score of symptom scale and financial difficulties indicate low QoL. The Vietnamese version was validated elsewhere and showed high/moderated validity and reliability.

Statistical analysis: The data obtained from study was analysed by STATA 12.0 (StataCorp, College Station, Texas, USA). The relationship between nutritional status and QoL was assessed by t-test, Mann-Whitney test and Pearson's correlation. P-value <0.05 was considered statistically significant.

RESULTS AND DISCUSSION

Participants' characteristics: Patients over 60 years old were 35.4%. Thirty-seven patients (56.9%) were male and twenty eight patients (43.1%) were female. 36 patients (55.4%) had stomach cancer and 29 patients (44.6%) had colorectal cancer, including 31 patients (48.5%) in stage II or III and 33 patients (51.5%) in stage IV.

Nutritional status: According to BMI classi-fication of WHO, 40.0% patients were underweight, 58.5% had normal weight and only one patient (1.5%) was overweight. The prevalence of malnutrition in gastric cancer was non-significantly higher than colorectal cancer (p=0.076). This underweight prevalence is lower than the finding of a study in Bach Mai hospital in 2012 in colorectal cancer patients with 58.6% patients had BMI <18.5 kg/m² (16). However, the result of the present study is higher than the report in France of A. Nourissat et.al in 2008 with only 8.6% or the finding of Reza et al. in 2011 with 10.9% of patients were underweight (13,17). The differences may due to differences in population, cancer type and stage, nutrition practice. However, the BMI index is often used to making decision about nutrition management. So, nutrition improvement and intervention to increase BMI for the patients are necessary.

As the classification of the scored PG-SGA, 18.5% patients were allocated with PG-SGA A. 61.5% patients were allocated with PG-SGA B and 20.0% patients with PG-SGA C, giving total a malnutrition prevalence of 81.5% patients. Especially, there was 27.8% gastric cancer patients had severe malnourishment. This prevalence is higher than the report of Nunilon Veergara and college in 2011 with 40.21% malnourished patients in the research or 43.4% patients in the report of A. Nourissat et al. (17,18). However, the present study has similar finding with another study on gastric cancer patients receiving chemotherapy, which showed 59% of the patients were malnourished, and 27.8% of the patients revealed serious malnutrition (19). Another study of AZ. Zalina et al. on patients with GI cancer showed a high prevalence of malnutrition with 74.3%, whereas 48.6% were classified as severely malnourished (9). Our study indicated that patient with gastric cancer had

significantly higher risk of malnutrition than patients with colorectal cancer (97.2% and 62.1%, p=0.000 respectively). This finding is similar to the finding in research of Liyan Zhang et.al, that rectal cancer patients had a lower risk of malnutrition than the other GI cancer (20). In this study, there was no significant difference of malnutrition risk between gender, age and cancer stage. From these results, GI cancer patients undergoing chemotherapy, especially gastric cancer, were vulnerable to be malnourishment and needed intensive support to improve nutritional status.

Albumin was conducted in all participants in this study. Hypoalbuminemia or albumin serum level lower than 35g/L was 23.1% and no significant difference was found between stomach and colorectal cancer (p=0.72). This prevalence is lower than the result of the research on advanced non-small cell lung cancer (50%) (21). Although, the prevalence is higher than the result of SH. Seo et al. with 14.5% or A. Nourissat et.al with 4.6% of patients had hypo-albumineamia (13,17). Our finding pointed that an essential intervention in providing and improving nutrition practice, dietary intake and also supplement during treatment are needed.

Quality of life: The different parameters of QoL across the different nutritional status classifications (PG-SGA, BMI and Albumin) are depicted in table 1. As the result of this study, all parameter scores of global and functional scales were higher in patients with well nourishment (PG-SGA A) or normal weight in compared with malnourished and underweight. Among the functioning domains, cognitive functioning showed the highest score in all patients with PG-SGA A or B and C, underweight or normal weight. On the other hand, all parameter scores of physical scales and financial difficulties were higher in malnourished or underweight patients. The highest scores of malnourishments and underweights were financial difficulties and fatigue. Moreover, the results show significantly higher scores in domains of global health and emotional functioning among well-nourished or normal weight patients than malnourished or underweight patients (p<0.05). While fatigue among patients with PG-SGA A or BMI ≥18.5 kg/m² was lower than the others (p<0.05). There were significantly differences between malnourishment and well nourishment in physical functioning, nausea and vomiting, pain and appetite loss (p<0.05). The differences of other scales between well nourishment and malnourishment, underweight and normal weight had non-significant.

Table 1. Assessment of patients' quality of life score according to their nutritional status by PG-SGA, BMI and Albumin

Variable	PG-SGA			BMI			Albumin		
	Malnourished (B & C)	Well-nourished (A)	p	Underweight (< 18.5 kg/m²)	Normal	p	Malnutrition (<35 g/l)	Normal (≥ 35 g/l)	p
Global score	47.5 ± 13.7	61.1 ± 13.5	0.003[b]	45.5 ± 14.0	52.99 ± 14.4	0.02[b]	52.8 ± 18.0	49.2 ± 13.5	0.54[b]
Physical functioning	67.9 ±115.1	80.6 ± 10.8	0.005[b]	66.7 ± 15.9	72.6 ± 14.3	0.23[b]	75.1 ± 12.5	68.8 ± 5.7	0.1[b]
Role functioning	55.3 ± 23.6	68.1 ± 22.98	0,1[b]	57.1 ± 23.65	58.1 ± 23.8	0.85[b]	56.7 ± 28.7	58.0 ± 22.1	0.8[b]
Cognitive functioning	94.6 ± 14.5	100 ± 0	0,13[b]	95.5 ± 14.6	95.7 ± 12.5	0.71[b]	96.7 ± 9.3	95.3 ± 14.3	0.94[b]
Emotional functioning	87.3 ± 17.7	97.2 ± 6.5	0.03[b]	84.9 ± 16.0	91.9 ± 16.7	0.02[b]	87.8 ± 12.5	89.5 ± 17.8	0.27[b]
Social functioning	65.1 ± 23.2	65.3 ± 20.7	0.95[b]	59.0 ± 21.7	69.2 ± 22.5	0.08[b]	73.3 ± 20.7	62.7 ± 22.7	0.12[b]
Fatigue	32.1 ± 20.6	5.6 ± 10.1	0.0001[a]	36.3 ± 24.3	21.1 ± 17.6	0.01[a]	25.9 ± 14.9	27.6 ± 23.5	0.8[a]
Nausea and vomiting	5.0 ± 15.2	0 ± 0	0.01[b]	7.1 ± 19.5	2.1 ± 7.8	0.3[b]	0 ± 0	5.3 ± 15.6	0.1[b]
Pain	24.0 ± 16.2	5.6 ± 8.2	0.0001[a]	25.0 ± 17.8	18.4 ± 14.7	0.05[a]	20.0 ± 15.7	21.3 ± 16.5	0.8[a]
Dyspnea	9.4 ± 20.0	0. ± 0	0.09[b]	11.5 ± 20.9	5.1 ± 16.3	0.09[b]	4.4 ± 11.7	8.7 ± 19.9	0.6[b]
Insomnia	22.01± 29.9	11.1 ± 21.7	0.25[b]	29.5 ± 34.4	13.7 ± 22.6	0.06[b]	26.7 ± 25.8	18.0 ± 29.5	0.12[b]
Appetite Loss	17.6 ± 25.8	2.78 ± 9.6	0.047[b]	17.9 ± 27.0	12.8 ± 22.4	0.4[b]	4.4 ± 11.7	18.0 ± 26.3	0.06[b]
Constipation	4.4 ± 14.7	2.8 ± 9.6	0.88[b]	5.1 ± 15.5	3.4 ± 12.8	0.6[b]	0 ± 0	5.3 ± 15.6	0.16[b]
Diarrhea	8.2 ± 18.4	2.8 ± 9/6	0.31[b]	7.7 ± 21.7	6.8 ± 12.6	0.66[b]	6.7 ± 13.8	7.3 ± 18.2	0.9[b]
Financial Difficulties	39.6 ± 29.3	27.8 ± 34.3	0.19[b]	42.3 ± 32.1	34.2 ± 29.1	0.31[b]	35.6 ± 29.5	38.0 ± 30.9	0.85[b]

[a]: ttest   [b]: Mann-Whitney test

As the result of the study, a significant association of QoL with nutritional status was found. Patients, who had higher PG-SGA score or malnourishment, had significantly lower score in domains of global health status (r= -0.45), physical, role, cognitive functioning and higher score in domains of fatigue (r= 0.59), nausea and vomiting, pain (r= 0.43), dyspnea, appetite loss (r= 0.43), constipation and financial difficulties (p<0.03). Adversely, patients with higher BMI had higher global score (r= 0.42) and lower score of fatigue, insomnia and financial scale in compared

with underweight patients significantly (p<0.05).

The association between nutrition and QoL was proved in many studies. Out of the 26 publications reviewed, 24 found that better nutritional status was associated with improved QoL and all eight studies in GI cancer concluded that better nutritional status was positively associated with better QoL (22). Based on the present study, the result indicated the same relationship, that patients had better nutritional status (lower PG-SGA score, greater BMI), had better QoL, or conversely, patients with malnutrition had impaired QoL. Table 2 shows a significantly positive correlation between PG-SGA score with symptoms: fatigue, pain and appetite loss, dyspnoea, nausea and vomiting, constipation, and negative correlation with global health status, physical functioning, role functioning, cognitive functioning. Other studies showed a similar relationship between PG-SGA score and main scales of QoL (23, 24).

Otherwise, in the present study, the correlation between BMI index and global score was significantly positive, while a significant negative correlation was observed in symptom domains: fatigue and insomnia (p<0.05). A research conducted on breast cancer patients on chemotherapy indicated that greater BMI was associated with better emotional and cognitive functioning and less fatigue (25).

Both PG-SGA score and BMI were significant associated with financial difficulties. The finding was the same with the one of a study among Korean intestinal cancer patients, a higher perceived economic burden from cancer treatment affected negatively on QoL (26).

In our study, we found no significant in the correlation between Albumin and QoL. The research of Tian J, 2008 about Nutritional status and quality of life in gastrointestinal cancer showed that patients had high level of albumin had a significantly better quality of life (22).

Table 2: Correlation between the QoL scores and nutritional parameters

Variable		PG-SGA score	BMI (kg/m^2)	Albumin (g/l)
Global score	(r)	-0.45	0.42	0.001
	(p)	0.0002	0.0005	0.99
Physical functioning	(r)	-0.35	0.198	-0.06
	(p)	0.004	0.11	0.66
Role functioning	(r)	-0.32	0.03	0.13
	(p)	0.01	0.86	0.34
Emotional functioning	(r)	-0.001	-0.05	0.07
	(p)	0.99	0.7	0.6
Cognitive functioning	(r)	-0.28	0.05	0.08
	(p)	0.025	0.7	0.55
Social functioning	(r)	-0.13	0.167	-0.17
	(p)	0.31	0.18	0.2
Fatigue	(r)	0.59	-0.25	-0.05
	(p)	0.000	0.044	0.73
Nausea and vomiting	(r)	0.3	-0.16	0.17
	(p)	0.016	0.21	0.78
Pain	(r)	0.43	-0.095	-0.125
	(p)	0.0004	0.45	0.36
Dyspnea	(r)	0.34	-0.093	0.08
	(p)	0.006	0.46	0.55
Insomnia	(r)	0.23	-0.26	0.02
	(p)	0.06	0.035	0.88
Appetite Loss	(r)	0.43	0.09	0.075
	(p)	0.0004	0.46	0.58
Constipation	(r)	0.295	-0.15	0.18
	(p)	0.017	0.24	0.17
Diarrhea	(r)	0.07	-0.02	0.025
	(p)	0.57	0.86	0.85
Financial Difficulties	(r)	0.31	-0.27	0.14
	(p)	0.01	0.03	0.3

CONCLUSIONS

Our study confirmed that malnutrition impaired QoL in GI cancer patients on chemotherapy. Thus, nutritional assessment and intervention are fundamental before, during and after treatment in order to get better nutritional status, reduced malnutrition and through that to optimize QoL.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper.

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