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Original Research

Prevalence of Malnutrition and Associated Factors in Newly Diagnosed Upper Gastrointestinal Cancer Patients Before Treatment

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Introduction: Upper gastrointestinal cancers (UGIC) related malnutrition has been found to harm cancer prognosis and treatment outcomes. The study purposed to investigate the prevalence of malnutrition and associated factors in newly diagnosed upper gastrointestinal cancer patients before treatment.

Material and Methods: A cross-sectional study included newly diagnosed UGIC patients from October 2020 to March 2022. Sociodemographic, clinical (type, stage, and comorbidities), functional [Eastern Cooperative Oncology Group (ECOG) Performance Status Scale], anthropometric measures [weight, height, the percentage of weight loss past 1-month], biochemical profiles [full blood count and albumin], total daily energy protein intake, and malnutrition level [Subjective Global Assessment (SGA)] were assessed.

Results: The study recruited 409 participants, and 92.1% were malnourished. The mean for age, weight, percentage of weight loss past 1-month, total daily energy and protein intake, SGA score, and serum albumin of participants were 60.3±12.5years, 57.8±15.1kg, -8.2±6.0%, 17±5kcal/ kg/day, 0.7±0.1g/kg/day, 12.2±4.5 and 35.6±6.1g/L respectively. About 88% and 96% experienced vomiting and dysphasia, respectively; 51.3% was ECOG scale 2. According to a multiple linear regression test, the percentage of weight loss past 1 month, serum albumin, dyspepsia, dysphagia, lymphocytes, and gender (male) were the significant factors associated with malnutrition.

Conclusion: UGIC patients are especially susceptible to malnutrition which might cause a decrease in therapy sensitivity, quality of life, and survival rate. Currently, proposed factors associated with malnutrition can assist in identifying UGIC-related malnutrition. Early nutrition screening and assessment followed with timely nutrition intervention is important to identify malnutrition and optimize nutrition status before treatment.

Introduction

According to Global Cancer Observatory (GLOBOCAN) 2018, Malaysia's cancer incidence is anticipated to double by 2040 (from 43,837 to 84,158 cases) [1]. In the past 13 years, the incidence rate of stomach cancer in Malaysia has decreased by 48% among males and 31% among females. Malaysia has a low risk of stomach cancer. Although there is evidence that it is decreasing, it remains a major source of mortality and morbidity. Every year, hundreds of Malaysians get and death from the disease [2]. In the context of Asia, Malaysia has an upper gastrointestinal cancer (UGIC) incidence (8.41 per 100,000) over 5 years, according to GLOBOCAN 2020 [3]. The mortality

rate of gastric cancer is 4.0%, and esophageal cancer is 1.3% among the Malaysian population [2].

The most well-established treatment for UGIC, including esophageal and gastric malignancies, is surgery with or without neoadjuvant chemoradiation or chemotherapy [4]. Many patients with UGIC need surgical intervention, resulting in higher metabolic demands and causing pre-existing malnutrition [5]. Malnutrition may result in extending energy shortages in the postoperative phase, increased risk of postoperative infectious complications, and a poor clinical outcome [6, 7]. Poor nutritional status, in combination with delayed and insufficient postoperative nutrition intervention, is linked to poor therapeutic outcomes [8]. The impact of the disease and treatment on nutritional status and, ultimately, quality of life is an important issue for individuals suffering from UGIC. These patients are frequently malnourished at diagnosis as a consequence of local tumor effects resulting in symptoms such as dysphagia, vomiting, insufficient nutritional intake, exhaustion, weight loss, and muscle atrophy [5]. Malnutrition and cachexia are related to lower quality of life, poor treatment tolerance, and higher morbidity and death in cancer patients [8, 9]. Numerous shreds of evidence have shown that malnutrition was associated with greater morbidity and mortality, prolonged hospitalization, more frequent readmission, treatment toxicity, increased healthcare costs, and a negative effect on the quality of life [9, 10]. Additionally, preoperative nutritional conditions influence tolerance to surgical stress and postoperative recovery [9, 11].

Nutritional assessment, nutrition therapy, and malnutrition prevention are significantly important for patients with UGIC as well as its consequences for clinical outcomes [8]. Malnutrition in UGIC is due to higher metabolic demands, inadequate food intake, or nutrient loss [12]. The necessity of detecting malnutrition in cancer patients early is critical, and there are various verified methods available to do so. Malnutrition is prevalent among UGIC patients; however, it has not been identified in particular groups of individuals with gastrointestinal cancers [4]. However, there is limited information regarding the nutrition status of UGIC patients in Malaysia. Hence, there is a critical need to raise awareness of the importance of identifying the prevalence of malnutrition and associated factors in newly diagnosed upper gastrointestinal cancer patients before treatment.

Materials and Methods

2.1 Study design

A cross-sectional study was conducted at the Institut Kanser Negara (National Cancer Institute) (IKN), Putrajaya, which is the cancer referral center for the west coast of Malaysia, from October 2020 to March 2022.

2.2 Participants

Consented Malaysians aged 18 years and above with diagnosed UGIC were assessed by clinical dietitians during admission for treatment in IKN. Those non-Malaysians, who had a history of oncology or surgical treatment and were not admitted to the ward were excluded from the study. All patients' records of histologically confirmed gastric or esophageal cancers and those seen by dietitians during the study period in IKN were screened, reviewed, and recorded in the study data collection form.

2.3 Sample size

The population proportion formula was used to estimate the sample size [13]. Prior data indicate that the proportion of loss of weight was 0.513, and the population size was 1860 [2]. If the Type I error probability and precision are 0.05 and 0.05, we will need to study 319 samples. With an additional 20% dropout rate, the sample size was 399 samples.

2.4 Study variables

2.4.1 Socio-demographic and clinical characteristic

Socio-demographic (age, ethnicity, and gender), as well as clinical characteristics (comorbidities, classification of malignant tumors, and diagnosis), were recorded in the data collection form.

2.4.2 Nutrition status

Height, weight, percentage weight loss past 1 month, percentage weight loss in the past 6 months, dietary intake, and biochemical profile were recorded. According to the Gibson 2005 procedure, the scheduled calibrated SECA weight scale was used to measure weight [14]. A formula was used to calculate the Body Mass Index (BMI) [15]. Dietary consumption was measured using a 24-hour dietary recall approach during an entrance face-to-face interview with a clinical dietician. To assist the subject in measuring the portion size of the items ingested, food models (portion sizes for carbohydrate and protein sources) and domestic measurements such as cups, spoons, and scoops, were used.

2.4.3 Subjective Global Assessment Score (SGA)

The SGA score that was developed by Detsky et al. in 1987 is widely employed, can identify people at nutritional risk, and predicts clinical consequences [16]. This assessment combines medical history and clinical findings and includes symptoms that could have an impact on food intake, functional capacity, and physical examination. There were three rating classifications: stage A for those who had no weight loss or a deficit in nutrition impact symptoms, dietary intake, functioning, and physical examinations; stage B for those who had moderate deficits or showed recent improvement in weight nutrition impact symptoms, dietary intake, functional and physical examinations; and stage C for those who had any severe weight loss, nutritional impact symptoms, dietary intake, function, and physical examinations.

2.4.4 Lymphocytes

A type of immune cell produced in the bone marrow and present in the blood and lymph tissue. Lymphocytes produce antibodies, aid in the destruction of tumor cells, and regulate immunological responses. A lymphocyte is a type of white blood cell [17]. One of the regular procedures during admission was a lymphocyte count (complete blood count) investigation.

2.4.5 Serum albumin

Albumin is required for the appropriate distribution of body fluids between blood arteries and body tissues; without albumin, the high pressure in the blood vessels would drive more fluids out into the tissues. Patients with hypoalbuminemia frequently present as a result of another illness process, such as starvation as a result of severe anorexia nervosa, sepsis, or malignancy [18]. Blood investigation (serum albumin) was one of the routine care during admission.

2.4.6 Eastern Cooperative Oncology Group scale (ECOG)

Loss of muscle mass, insufficient food intake, and depression are all factors that result in poor performance status. The ECOG performance status is used to evaluate oncology patients' independence and physical functioning [19].

2.5 Statistical analyses

Nutritionist Pro food Software version 2.4 (Axxa Systems, VA, USA) was used to analyze the food intake data. The summary of the analysis provided energy (kcal) and protein (grams) intakes. The analysis was carried out employing IBM SPSS Statistics for Windows (Version 23.0. Armonk, NY: IBM Corp.). Participants were divided into three groups for this analysis, which were well-nourished (SGA A), moderately malnourished (SGA B), and severely malnourished (SGA C). Descriptive statistics were used to describe participants' characteristics. Continuous data were presented in mean ± standard deviation. Categorical data were presented in frequency and percentage. Pearson's product-moment correlation for data with a normal distribution was used to get the correlation coefficient between the two variables. A Durbin-Watson statistic indicated residual independence of 2.003; Partial regression plots and a plot of studentized residuals versus projected values were used to assess linearity; and Visual inspection of a plot of studentized residuals vs. unstandardized expected values revealed homoscedasticity. As measured by tolerance values larger than 0.1 but less than 10, no indication of multicollinearity was found. A Q-Q Plot revealed that the normality assumption was met. A multiple linear regression test was applied to identify the factors related to malnutrition in newly diagnosed UGIC patients.

Results

The study recruited 409 participants, and 92.2% (n=377) were malnourished (SGA B and SGA C). The mean for age, weight, percentage of weight loss past 1-months, total daily energy and protein intake, SGA score, and serum albumin of participants were 60.3±12.5years, 57.8±15.1kg, -8.2 ± 6.0%, 17 ± 5kcal/kg/ day, 0.65 ± 0.19g/kg/day, and 35.6 ± 6.1g/L respectively (Table 1 and Table 2).

	SGA A	SGA B	SGA C	All	p-value
	(n=32)	(n=351)	(n=26)	(N = 409)	
Age (years)	55.2 ± 12.9	60.9 ± 12.3	58.3 ± 13.7	60.3 ± 12.5	[a]0.028*
Gender (n, %)					[b]0.016*
Male	27	249	13	289 (71)	
Female	5	102	13	120 (29)	
Ethnicity (n, %)					[b]0.489
Malay	18	165	10	193 (47)	
Chinese	11	120	8	139 (34)	
Indian	3	66	8	77 (19)	
Diagnosis (n, %)					[b]0.001**
Gastric cancer	24	148	10	182 (44)	
Esophageal cancer	8	203	16	227 (56)	
Classification of Malignant Tumors (n, %)					
T					[b]0.004**
1	0	12	2	14 (4)	
2	13	56	2	71 (17)	
3	14	166	10	190 (46)	
4	5	117	12	134 (33)	
N					[b]0.098
0	13	83	5	101 (25)	

1	16	175	10	201 (49)	
2	2	72	9	83 (20)	
3	1	21	2	24 (6)	
M					[b]0.010*
0	31	271	17	319 (78)	
1	1	80	9	90 (22)	
Comorbidity (n, %)					[b]0.254
Yes	22	179	13	214 (52)	
No	10	172	13	195 (48)	

Table 1. Socio-demographic and Clinical Characteristics of Newly Diagnosed Upper Gastrointestinal Cancer Patients.

*p<0.05, **p<0.01, ***p<0.001. [a]One way ANOVA test; Bonferroni test was employed for post hoc analyses. [b]Chi Square test

Variable	SGA A	SGA B	SGA C	All	p-value
	(n=32)	(n=351)	(n=26)	(N = 409)	
Anthropometry					
Weight (kg)	67.2 ± 17.0	58.2 ± 14.4	41.4 ± 7.2	57.8 ± 15.1	[a]<0.001***
Height (m)	1.65 ± 0.05	1.63 ± 0.09	1.57 ± 0.10	1.63 ± 0.09	[a]0.003**
BMI (kg/m^2)	23.5 ± 5.5	21.9 ± 4.9	16.7 ± 2.5	21.7 ± 5.0	[a]<0.001***
Percentage of weight loss within 1 month (%)	-5.0 ± 4.7	-8.1 ± 5.8	-13.5 ± 5.9	-8.2 ± 6.0	[a]<0.001***
Percentage of weight loss within 6-months (%)	-11.5 ± 10.8	-18.7 ± 8.4	-29.5 ± 9.4	-18.8 ± 9.3	[a]<0.001***
Muscle Wasting (n, %)					[b]<0.001
Present	7	244	26	277 (68)	
Absent	25	107	0	132 (32)	
Fat Wasting (n, %)					[b]<0.001
Present	7	240	26	273 (67)	
Absent	25	111	0	136 (33)	
Biochemical data					
Serum Albumin (g/L)	40.1 ± 4.3	35.4 ± 6.0	32.9 ± 6.0	35.6 ± 6.1	[a]<0.001***
Hemoglobin (g/dL)	12.0 ± 2.2	10.9 ± 2.4	10.9 ± 2.3	11.1 ± 2.4	0.06
Lymphocytes (10^9/L)	1.9 ± 0.7	1.7 ± 0.7	1.3 0.6	1.7 ± 0.7	[a]0.003**
Platelet (10^9/L)	312.3 ± 92.9	338.4 ± 134.1	347.7 ± 149.8	336.9 ± 132.4	[a]0.517
Diet Texture toleration (n, %)					[b]0.005**
Soft diet	5	143	13	161 (39)	
Full liquid diet	27	208	13	247 (61)	
Dietary Intake					
Energy intake (kcal/kg/day)	21 ± 4	17 ± 6	16 ± 6	17 ± 6	[a]<0.001***
Protein intake (g/kg/day)	0.76 ± 0.14	0.67 ± 0.19	0.64 ± 0.18	0.65 ± 0.19	[a]0.003**
Gastrointestinal symptoms (n, %)					
Vomit					[b]<0.001***
Yes	20	314	25	359 (88)	

No	12	37	1	50 (12)	
Dysphagia					[b]0.001***
Yes	27	341	26	394 (96)	
No	5	10	0	15 (4)	
Dyspepsia					[b]0.004**
Yes	9	230	24	263 (64)	
No	23	121	2	146 (36)	
Functional Status (n, %)					
ECOG					[b]0.008**
0	6	50	1	57 (14)	
1	4	88	11	103 (25)	
2	21	180	8	209 (51)	
3	1	32	6	39 (10)	
Nutrition care plan (n, %)					[b]0.015*
high protein high calories diet + ONS	9	50	0	59 (14)	
Full Enteral Feeding	23	264	20	307 (75)	
Parenteral Nutrition	0	35	6	41 (10)	

Table 2. Nutritional Assessments, Functional Status, and Nutrition Care Plan Newly Diagnosed Upper Gastrointestinal Cancer Patients.

Abbreviation: ECOG, Eastern Cooperative Oncology Group; *p<0.05; **p<0.01; ***p<0.001; [a]One way ANOVA test; Bonferroni test was employed for post hoc analyses; [b]Chi Square test

About 46% was tumor size (T) 3, 88%, 96%, and 53% experienced vomiting, dysphagia, and dyspepsia, respectively; 68% experienced muscle wasting; 61% tolerated a full liquid diet only.

A multivariate linear regression test found that the percentage of weight loss past 1-months, serum albumin, dyspepsia, dysphagia, lymphocytes, and gender (male) were the significant variables as the factors associated with malnutrition in newly diagnosed UGIC patients (Table 3).

		Univariate analysis			Multivariate analysis	
Variables	Beta	95% CI	p-value	Beta	95% CI	p-value
Constant				12.376		
Percentage of weight loss within 1-months (%)	0.305	0.231 – 0.380	<0.001***	0.23	0.158 – 0.303	<0.001***
Serum Albumin (g/L)	-0.228	-0.139	<0.001***	-0.163	-0.133	<0.001***
Dysphagia (present)	5.117	2.819 – 7.0414	<0 .001***	3.136	1.042 – 5.231	0.003**
Lymphocytes (10^9/L)	-1.259	-1.231	<0.001***	-0.763	-1.13	0.008**
Dyspepsia (present)	1.321	0.445 – 2.197	0.003**	1.274	0.498 – 2.051	0.001**
Gender (male)	1.02	0.055 – 1.986	0.038*	0.954	0.106 – 1.803	0.028*
Daily Energy Intake (kcal/kg/day)	-0.123	-0.156	0.002**			

Diagnosed with Esophageal Cancer	0.907	0.022 – 1.792	0.045*			
Hemoglobin (g/L)	-0.42	-0.366	<0.001***			
Tumor size (T)	0.869	0.319 – 1.419	0.002**			

Table 3. Association between Independent Variables and SGA Score and Factors Associated with Malnutrition (SGA score) in Newly Diagnosed Upper Gastrointestinal Cancer Patients (N = 409).

Abbreviation: ECOG: Eastern Cooperative Oncology Group; *p<0.05; **p<0.01; ***p<0.001; Stepwise Multiple Linear Regression. R = 0.501; R2 = 0.251; adjusted R2 = 0.240; F = 22.441, p = 0.000

SGA scores were statistically significantly associated with the multiple linear regression model, F (6, 402) = 22.441, p < 0.000, adjusted R2 = 0.24. The current factors could explain 24% of the malnutrition risk in UGIC patients. All six (6) factors contributed statistical significance to prediction, p < 0.05. The predicted equation, SGA score = 12.376 + 0.230 percentage of weight loss past 1-months – 0.163 serum albumin + 1.274 dyspepsia + 3.136 dysphagia - 0.763 lymphocytes + 0.954 gender (male).

Discussion

Cancer patients are at a high risk of malnutrition, and surgical stress may worsen this catabolic condition. Cancer patients frequently encounter malnutrition, which is caused by both the disease and the therapy, both of which put their nutritional status at risk. Malnutrition caused by the disease will result in notable weight loss, changes in body composition, and impairment in physical function [6, 10]. Cancer patients with gastrointestinal tumors have the highest prevalence of nutritional disorders, reaching as high as 90% [19], and doubtlessly influence tolerance to surgical stress and postoperative recovery [20]. Inadequate daily consumption of food, pre-existing chronic disease, tumor-associated metabolic changes, mental stress, and low socioeconomic position all contribute to pre-operative malnutrition [11, 21]. As a result, preoperative malnutrition increases the risk of postoperative complications and death, as well as hospitalization and overall costs [6].

ESPEN practical guideline

Clinical Nutrition in Cancer 2021 stated that cancer- related malnutrition frequently remains unrecognized, underestimated, and under-treated in clinical practice, with an estimated 10 - 20% of cancer patients dying as a result of malnutrition-related complications rather than the tumor itself [22]. However, the systematic review stated only two of three digestive cancer studies addressed dietary status, and the results were often underreported [6, 10]. It is certainly surprising that despite the frequency of malnutrition in the cancer population, nutritional evaluation is not a routine practice [4, 10]. Studies have shown that 50% of malnourished patients are not diagnosed as undernourished or malnourished and thus remain untreated [23].

The current study reported that 92.2% of upper gastrointestinal cancer (UGIC) patients are malnutrition and experience -8.2 ± 6.0% of weight one month before diagnosis. This is in line with another study that showed that UGIC poses the highest risk to the development of malnutrition, and studies have shown that 85% of patients are severely or moderately malnourished or at risk of malnutrition. This is considered to be an indicator of severe malnutrition (5, 40) and is associated with poor prognosis [24] and increased treatment side effects [25].

The underweight UGIC patients were associated with worse survival. Preoperatively, overweight or

slightly to moderately obese individuals (BMI 23 to 30 kg/m^2) had a higher overall survival rate [25].

To date, there is no single “gold standard” or clinically ideal evaluation approach to assess nutritional status with UGIC [19]. The American Society for Parenteral and Enteral Nutrition (ASPEN) and the European Care Research Collaborative recognize that determining a patient’s nutrition status is unable to be accomplished with a single measurement [19]. The nutritional status of the present study is evaluated by combining several parameters that include unintentional weight loss, BMI, SGA score, nutritional intake, and functional status using the ECOG scale. The present study showed that the mean BMI is 21.7kg/m^2 which is under the normal BMI category, but 92.2% are under-malnourished, 61% impaired functional status (ECOG scale 2-3), and average daily energy intake is less than 25 kcal/kg/day. Studies stated that when used as a sole nutrition assessment tool, BMI alone is ineffective at detecting changes in nutritional status [10, 26]. Another study concluded that using BMI alone to define nutritional risk may not be reliable because cancer patients may be underweight or overweight at the time of diagnosis. Nevertheless, cancer- related cachexia and sarcopenia are very common in both groups. Overweight individuals who lose weight are not considered at risk, and sarcopenic patients’ assessments may be biased [23, 27]. A combination of weight loss with the assessment of nutritional intake, BMI, and inflammatory status was then recommended. Another recent systematic review found that BMI and the SGA were the most commonly used assessment instruments in cancer patients [10, 20].

The SGA score that was developed by Detsky et al. in 1987 is widely employed, can recognize malnourished individuals, and forecasts therapeutic results [16]. This assessment combines medical history and clinical findings and includes symptoms that may affect food intake, functional capacity, and physical examination [23]. The current study showed the majority (92.2%) of UGIC patients are malnourished or at risk of malnourishment. Previous studies reported that SGA, the nutrition assessment tool, identified about 43.5% of cancer patients [28] and 57.2% of gynecologic cancer [10] were malnourished upon admission. A comprehensive dietary intake, including current intake, dietary intake history, and any recent changes, should be obtained in combination with the SGA. The present study concluded that daily energy intake is less than 25 kcal/kg/day. Being malnourished in UGIC cancer is caused by a reduction in dietary intake as a consequence of mechanical obstruction and cachexia, both of which occur as cancer progresses [29]. Insufficient nutritional intake occurs when patients find it difficult to eat for a week or if their dietary intake falls below 60% of their estimated requirements. Anorexia has been identified as a risk contributor to malnutrition, and changes in appetite may happen irrespective of the patient’s baseline weight [7]. Cancer patients state cluster symptoms such as inadequate nutrition, weight loss, diminishing physical performance, exhaustion, pain, and depression. In turn, individuals with advanced disease have a lower quality of life and less likelihood of survival [18]. It is well known that cancer cachexia leads to significant weight loss due to loss of muscle mass and decreased fat mass [30]. Unintentional weight loss needs to be detected and recognized as it reduces physical function, survival outcomes, and quality of life [23].

Our study showed that about 64%, 88%, and 96% experienced dyspepsia, vomiting and dysphasia, respectively. UGIC patients develop common gastrointestinal symptoms such as vomiting, dysphagia, and dyspepsia in early and advanced stages. Other common symptoms reported by patients were weight loss, hematemesis/ melaena, poor appetite, fatigue, early satiety/fullness, and belching [31]. Some patients experienced more than one symptom. It is noteworthy that GI symptoms such as nausea, mucositis, constipation, diarrhea, and early satiety may alter food choices and can decrease dietary intake in patients with UGIC [19]. About 61% of UGIC patients in the current study experienced impaired functional status (ECOG scale 2-3). Poor functional status may relate to loss of muscle mass, inadequate food intake, and depression. In oncology patients, the ECOG functional status is used to assess independence and physical functioning [19]. Low serum albumin is shown as one of the determinants in the current predictive model of malnutrition. Serum albumin levels before treatment have the potential for prediction in cancer. Preoperative serum albumin is a useful tool for determining malnutrition as well as forecasting patient outcomes and

survival. When accompanied by malnutrition, detection of hypoalbuminemia and early treatments may reduce complication rates [32].

Our findings support the gender disparity found in our sample and might indicate that it is easier to diagnose malnutrition in men since they might demonstrate a more consistent, less variable “classic” view of malnutrition [33]. According to past studies, patients with esophageal cancer are more likely to be malnourished than patients with stomach cancer. Due to inadequate nutrient intake or absorption, patients with esophageal cancer frequently experience severe weight loss and are more likely to become malnourished, which can have measurable negative implications on body weight, body composition, function, and clinical outcomes [34]. There are 80% of patients who experienced more than 16% unintentional weight loss at the time of diagnosis [34]. The loss of weight can be attributed to decreased food intake in conjunction with dysphagia, which is a typical clinical symptom at the moment of diagnosis [6]. Systemic inflammation caused by tumor factors causes a higher expenditure of energy and changed macronutrient metabolism, which leads to loss of weight along with specific skeletal muscle atrophy [35]. The incidence of malnutrition in males was significantly higher than that in females. This could be caused by financial difficulties in obtaining proper health care. The exact gender difference is unknown. However, this could be attributable to immunologic variations and dietary habits [36].

Preoperative immunological and nutritional health are substantially correlated with postoperative morbidities as well as the overall survival of cancer patients, according to a growing body of studies. The most often utilized markers to assess nutritional and immune status were the serum albumin concentration and lymphocyte count, and these results were used to establish additional measures for various malignancies [17]. Albumin concentrations are correlated with alterations in nutritional status and can be used to identify impending nutritional deficiencies. Additionally, lymphocytes could be used to assess immune-nutritional health [37]. Malnourished cancer patients exhibited lower levels of serum albumin and lymphocytes, according to research. Malnutrition was more prevalent in advanced cancer stages (79%). It was congruent with research done in Kenya, which found that malnutrition was found in 66.9% of the population. This disparity may be attributed to the participants’ economic situation as much as the quality of therapy. Malnutrition was significantly related to the cancer stage. This could be driven by insufficient medical attention, malnutrition associated with cancer, or the pathophysiology of cancer cells, which necessitate a high-calorie diet in advanced stages [38].

European Society for Clinical Nutrition and Metabolism (ESPEN) in cancer patients highlighted the significance of early screening and proactive monitoring of dietary intake, nutrition-related complaints, muscle mass, physical performance, and systemic inflammation [4]. When a cancer patient is diagnosed as being at risk of malnutrition, a comprehensive nutritional assessment must be administered by a dietitian. A nutritional status assessment is required for a diagnosis of nutritional compromise, and multidisciplinary care is then required [10, 11]. Because of the adverse effects on morbidity and mortality, there is a critical need to increase consciousness among healthcare professionals regarding the significance of timely screening and identifying individuals at nutritional risk, which could result in favorable results. Nutritional assessment is a vital component of the preoperative assessment of surgical cancer patients [21]. A detailed nutrition assessment entails determining the individual cause (s) of malnutrition and addressing challenges to desirable food intake [39]. Potentially curative cancer candidates must complete this stage of nutritional therapy since intervention before surgery can improve nutritional status and postoperative outcomes [5].

Strength and limitation

The wide inclusion criteria of UGIC patients before treatment, as well as the comprehensive assessment of nutritional status, were a strength of this study. We address a critical clinical issue in addition to highlighting a clinical management gap. UGIC patients are commonly overlooked for treatments that require nutrition deficit restoration before the treatment’s initial stage. There are a

few limitations. First of all, the current study only includes a single nutritional assessment and evaluation. Second, as the aim was to investigate malnutrition, the study was set up to include only UGIC patients instead of those who had been diagnosed with other types of cancer.

In conclusion, malnutrition in individuals with cancer has a wide range of implications, including a decrease in response and sensitivity to therapy, decreased quality of life, lower survival, and increased care expenditures. As this type of cancer has a significant impact on the digestive system, UGIC patients are especially susceptible to malnutrition. Malnutrition in cancer patients highlights the importance of nutrition screening and assessment before, during, and post-treatment. The currently proposed factors associated with UGIC-related malnutrition can assist in identifying malnutrition. Hence, the early multidisciplinary-team approach-based nutrition intervention and nutrition-related symptom management could be implemented to minimize nutrition depletion, improve functional status, and enhance clinical outcomes before therapy or even higher survival rates.

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Conflict of Interests

The authors have no relevant financial or non-financial interests to disclose.

Authors Contribution

CYH conceptualized, designed, and completed the data collection, and interpretation of the study. BZH analyzed the data. CYH was involved in the execution of the study. CYH wrote, reviewed, and edited the manuscript. CYH finalized the manuscript. The first draft of the manuscript was written by CYH and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Data Availability

The datasets generated during the current study are available from the corresponding author upon reasonable request.

Ethics Approval

This study was performed in line with the principles of the Declaration of Helsinki. The Malaysian Ministry of Health’s Medical Research and Ethics Committee (MREC) sought ethical approval for

this study, which was filed in the National Medical Research Registry (NMRR) with research ID: NMRR ID-22-00792-HKU.

The study's registered ID under the ClinicalTrials.gov protocol registration and results system is NCT05867810.

Consent to participate

Informed consent was obtained from all individual participants included in the study.

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