Malnutrition risk of patients with oral cavity cancer and other related factors at National Cancer Hospital 2018-2019.

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Abstract

Background and Objectives: Malnutrition refers to deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients. In cancer, malnutrition is the common status in patients because of combination of undernourishment and inflammation. In oral cavity cancer patients, malnutrition is becoming more and more common because of the localization of the tumor. The aim of this study is to evaluate the malnutrition risks and other related factors in patients with oral cavity cancer.

Methods and study design: The cross-sectional research was carried out with the participation of 220 patients aged 18 years and older from May 2018 to October 2019 in attempt to evaluate the malnutrition risk and pathological factors of oral cavity cancer cases.

Results: In accordance with the PG-SGA toolkit, while the percentage of patients facing mild and moderate malnutrition risk was 63.2%, that of severe malnutrition risk was 18.2%. Besides, 23.2% was malnourished as regard to BMI classification. Patients in stage IV had a higher possibility of malnutrition (4.71 times) than those in stage I (OR(95% CI):4.71(1.08-20.57)). The method of preparing food for patients by ordering ready-to-eat foods raised the malnutrition situation by 6.67 times in comparison with incorporating the hospital diet (OR(95% CI);6.67(1.68-26.44)). Additionally, losing more than 10% of weight within 6 months also made the proportion of malnourished patients grow higher than those who experienced whether weight gain or unchanged within 6 months, the results were statistically significant. Furthermore, people with gastrointestinal symptoms were many times more likely to suffer from malnutrition than those without, the findings were of statistical significance.

Conclusions: Oral cavity cancer patients posed a significant chance of malnutrition. Patients in late stage of disease, weight loss, gastrointestinal symptoms and non-compliance with pathological nutrition care were at greater risk of malnutrition than most cases.

Introduction

Not only does positive nutrition play an essential role in cancer care and treatment but also makes a considerable contribution to enhancing the effectiveness of treatment, the quality of patients' lives as well as extending their life span [1]. Cancer patients regularly face the danger of unexpected weight loss. To be specific, 31-87% of them suffer from this condition, especially ones with oral cavity cancer - head and neck cancer [2]. This group of patients face high malnutrition risk (MR) due to local and systemic disorders attributable to pathological characteristics and treatments. With radiotherapy, 25% of patients suffer from complications such as loss of taste and/or dry mouth before and up to more than 80% after the end of treatment [3]. Chemotherapy frequently leads to decreased

nutrient intake in patients, primarily through direct as well as indirect mechanisms [4].

Malnutrition in cancer sufferers has a direct effect on the survival rate of this condition. Studies have estimated that for every 10% loss in muscle mass, the probability of morality is developed by 10% [5,6]. For oral cavity cancer patients, cases with a BMI <22.8 have a greater chance of morality (relative risk [RR]=1.292, p=0.022). In addition, people with preoperative serum albumin levels <4.15 g/dl are frequently in association with inferior prognosis (RR=1.313, p=0.016) [7]. Amongst risk factors linked to prognosis of death, nutrition is related in about 35% of all human cancer deaths, ranges from 10% to 70% [8]. High variations indicate the inadequate awareness in terms of nutrition as well as malnutrition

possibility of cancer patients in general and in oral cavity patients in particular. The assessment of nutritional status of patients, therefore, should be centered more on. Nutrition management is crucial for preventing or minimizing side effects of oncological treatment modalities [9]. This study was hence conducted in order to attain two key objectives:

To evaluate the nutritional status of patients with oral cavity cancer.

Analyze several factors related to nutritional status of patients with oral cavity cancer.

Materials and Methods

Patients aged 18 years or older have been diagnosed with oral cavity cancer at National cancer Hospital. The patients have been receiving surgery, chemicals, radiotherapy at National cancer Hospital. The patients agree to be part of the analysis and have full records.

Study design

Cross-sectional description

Research period

5/2018 -10/2019.

Choose a template and sample size

The sample size is calculated using the sample size formula for estimating a proportion in the population:

$n=Z^2 (1-\alpha/2). p.(1-p)/(\epsilon.p)^2$

There in:

n: the sample size of the study

p: proportion of cancer patients facing malnutrition risk according to PG-SGA, taken from previous study p=0.711 [10].

α: relative value=0.1

ε: statistical significance level, take α=0.05. Then, Z(1-α/2)=1.96.

Getting into the formula, the sample size of the research was calculated: n=156. Eventually, the sample size was rounded up to at least 160 patients.

Sampling: By convenient sampling, 220 patients with oral cavity cancer undergoing surgery, chemicals, radiotherapy were selected during the study period.

Research indicators and variables

Subject information were collected from hospitalized patients according to the toolkit:

Variables: general information about the patient (age, gender, occupation), anthropometric index, some hematological and biochemical test results.

Index: nutritional status (PG-SGA, BMI)

Research procedure

Eligible hospitalized patients were chosen to take part in the research:

Interviewing to collect information of research subjects and combine with observation to classify nutrition risk checklist according to PG-SGA (Patient-generated subjective global assessment: Subjective overall assessment).

Measuring anthropometric indicators

Making statistics of blood and biochemical formula findings from patient records to assess nutritional status on the basis of biochemical and hematological criteria.

Statistical analysis

All items were analyzed using descriptive statistics. Data are encrypted, processed and analyzed by STATA 12.0 software:

Test χ is used to measure the discrepancy between two ratios², statistically significant with p<0.05. In the case of samples less than 5, make use of χ^2 with Fisher correction.

T-Student for the comparison of average (p<0.05)

Ethical considerations

The study was approved by the Ethics Committee in Biomedical Research of National Cancer Hospital. The study subjects were clearly explained about the purpose and significance of the research and voluntarily participated in the research. The information gathered is solely for research purposes.

Results

General information and treatment characteristics are show in Table 1. Table 1 shows that 220 patients were selected for the study, the largest slice of 59.5% belonged to the 40-59 age group. The rate of male patients was 75.9% which roughly tripled that of female. The most common cancer was palate cancer (48.2%), followed by other cancers including tongue (32.7%), floor of mouth (12.7%). The vast majority of patients were detected in stages III and IV (28.6% and 45.9%). The method of treatment at the time of study was mainly radiotherapy (66.8%), followed by surgery (33.2%).

Patients with weight loss had a high proportion, specifically 5-10% weight loss was 15.6%, and over 10% weight loss was 8.4% in 1 month. These rates increased in 6 months, 5-10% weight loss and over 10% weight loss were 33.5% and 16.8% respectively. The majority of researched subjects had oral feeding (91.4%).

While more than a half had self-cooked food (63.2%), only 7.7% purchased food outside. According to the classification of PG-SGA, there was a high possibility that the patients would face malnutrition risk. To be specific, 63.2% were at risk of mild and moderate malnutrition (PG SGA B) and the number for severe malnutrition was 18.2% (PG SGA C). Conforming to BMI classification, 23.2% of subjects were underweight.

The risk of malnutrition are shows Table 2-5. The Table 2 indicates that the later the stage of cancer, the greater the risk of malnutrition. While the proportion of patients encountering malnutrition danger in stage IV was 88.1%, that in stage I decelerated by 29% to 59.1%, the difference was statistically significant with $p<0.05$. As a further matter, nutrition routes were also closely related to patients' risk of malnutrition. The results in Table 2 illustrates that 100% of patients in the feeding tube group posed the risk of malnutrition, higher than those who could still have oral feeding (79.6%), the difference was of statistical significance with $p<0.005$.

According to the Table 3, the most common gastrointestinal symptoms were no appetite (47.3%), dry mouth (45.9%), fatigue (43.6%), pain (42.3%), and mouth sores (35.5%). The study demonstrates that the proportion of patients with mouth sores registered a higher rate of being underweight (32.1%) than those without (18.3%), the difference was statistically significant with $p<0.05$. Patients with smells bother me (42.9%) made up a higher percentage of underweight than patients without (19.5%), the difference was statistically significant with $p<0.05$.

Table 4 presents some pathological factors which include stage of cancer, weight loss, and digestive symptoms; food preparation methods both heightened the possibility of

malnutrition in patients. The later the stage of disease, the higher the risk of malnutrition. Patients in stage IV posed a higher chance of malnutrition (4.71 times) than those in stage I (OR(95% CI):4.71(1.08-20.57)).

As regard to the symptoms of weight loss, the more weight they lost, the greater the risk of malnutrition. PG SGA indicated that 5-10% weight loss within 6 months would raise the risk of malnutrition in cancer suffers by 14.43 times (OR(95% CI):13.43(2.35-76.62)), especially if patients had critical weight loss (>10%), the risk would be risen by 20 times (OR(95% CI):19.86(1.73-28.16)) in comparison with those who did not lose weight. Patients with gastrointestinal symptoms were approximately 50 times more likely to face nutritional deficiency than those without (OR(95% CI): 49.18(10.4-232.58)).

In Table 5, in conformity with BMI, unintended weight loss was also of significance to the acceleration of malnutrition risk in patients. Specifically, if the group of patients underwent more than 10% weight loss within 6 months, the possibility of underweight would surge by 16.56 times as against the other group (OR(95% CI):16.56(4.53-60.48)). Moreover, ones who arbitrarily ordered food outside were at risk of being 6.67 times more likely to be malnourished than those following the hospital diet (OR(95% CI):6.67(1.68-26.44)).

Table 1: General information and treatment characteristics of research subjects.

General information		Frequency (N=220)	Ratio (%)
Age	18-39 years old	23	10.5
	40-59 years old	131	59.5
	≥ 60 years old	66	30
	Average	53.3 ± 12.1	
Gender	Male	167	75.9
	Female	53	24.1
Type of cancer	Tongue	72	32.7
	Floor of mouth	28	12.7
	Gingiva	4	1.8
	Palate	106	48.2
	Oral mucosa	7	3.2
	Salivary glands	2	0.9
	Lips	0	0
	Others	1	0.5
Stage of cancer	I	22	10
	II	34	15.5
	III	63	28.6
	IV	101	45.9
Treatment method	Surgery	73	33.2

	Radiation therapy	147	66.8
Nutrition route	Oral feeding	201	91.4
	Feeding tube	19	8.6
Food prepartion	Hospital diet	48	21.8
	Self-cooked	139	63.2
	Order outside	17	7.7
	Others	16	7.3
BMI	< 18.5	51	23.2
	18.5-22.5	155	70.4
	>22.5	14	6.4
PG GSA	PG SGA A	41	18.6
	PG SGA B	139	63.2
	PG SGA C	40	18.2
Weight change in 01 month	No change/ weight gain	56	33.5
	Lose 1-5%	71	42.5
	Lose 5-10 %	26	15.6
	Lose >10%	14	8.4
Weight change in 06 month	No change/ weight gain	28	16.8
	Lose 1-5%	55	32.9
	Lose 5-10 %	56	33.5
	Lose >10%	28	16.8

Table 2: The risk of malnutrition by stage of cancer, treatments, nutrition route and food preparation methods.

PG SGA N=220		PG SGA A N(%)	PG SGA B/C N(%)	p
Stage of cancer	I (n = 22)	9 (40.9)	13 (59.1)	0.009
	II (n = 34)	5 (14.7)	29 (85.3)	
	III (n = 63)	15 (23.8)	48 (76.2)	
	IV (n = 101)	12 (11.9)	89 (88.1)	
Treatment method	Surgery (n = 73)	18 (22.7)	55 (75.3)	0.106
	Radiation therapy (n = 147)	23 (15.7)	124 (84.3)	
Nutrition route	Oral feeding (n = 201)	41 (20.4)	160 (79.6)	0.029
	Feeding tube (n = 19)	0 (0.0)	19 (100.0)	
Food preparation	Hospital diet (n = 48)	10 (20.8)	38 (79.2)	0.461
	Self-cooked (n = 139)	28 (20.1)	111 (79.9)	
	Order outside (n = 17)	1 (5.9)	16 (94.1)	
	Others (n = 16)	2 (12.5)	14 (87.5)	

Note: *PG SGA A: No risk of malnutrition; PG SGA B/C: There is a risk of malnutrition, including PG SGA B: a slight or moderate malnutrition risk; PG SGA C: severe malnutrition risk.

Table 3: Malnutrition according to acquired gastrointestinal symptoms.

Gastrointestinal symptoms N (%)		BMI<18,5 n=51	BMI ≥ 18,5 n=169	P
No appetite 104 (47,3)	Yes	23 (22.1)	81 (77.9)	0.723
	No	28 (24.1)	88 (75.9)	
Dry mouth 101 (45,9)	Yes	25 (24.8)	76 (75.2)	0.611
	No	26 (21.9)	93 (78.1)	
Fatigue 96 (43,6)	Yes	26 (27.1)	70 (72.9)	0.228
	No	25 (20.2)	99 (79.8)	
Pain 93 (42,3)	Yes	25 (26.9)	68 (73.1)	0.266
	No	26 (20.5)	101 (79.5)	
Things taste funny or have no taste 89 (40,5)	Yes	22 (24.7)	67 (75.3)	0.656
	No	29 (22.1)	102 (77.9)	
Problems swallowing 85 (38,6)	Yes	25 (29.4)	60 (70.6)	0.082
	No	26 (19.3)	109 (80.7)	
Mouth sores 78 (35,5)	Yes	25 (32.1)	53 (67.9)	0.021
	No	26 (18.3)	116 (81.7)	
Smells bother me 35 (15,9)	Yes	15 (42.9)	20 (57.1)	0.003
	No	36 (19.5)	149 (80.5)	
Nausea 31 (14,1)	Yes	5 (16.1)	26 (83.9)	0.315
	No	46 (24.3)	143 (75.7)	
Constipation 31 (14,1)	Yes	9 (29.0)	22 (71.0)	0.405
	No	42 (22.2)	147 (77.8)	
Vomiting 13 (5,9)	Yes	5 (38.5)	8 (61.5)	0.178
	No	46 (22.2)	161 (77.8)	
Diarrhea 3 (1,4)	Yes	1 (33.3)	2 (66.7)	0.675
	No	50 (23.0)	167 (77.0)	
Feel full quickly 27 (12,3)	Yes	7 (25.9)	20 (74.1)	0.718
	No	44 (22.8)	149 (77.2)	

Note:* BMI<18.5: Underweight patients; BMI ≥18.5: normal-weight or overweight patient.

Table 4: Relationship between some pathological factors and the malnutrition risk of patients according to PG SGA.

Pathological factors		PG SGA (B+C/A)	
		MR/No MR	OR* (95%CI)
Treatment method	Surgery	55/18	1
	Radiation therapy	124/23	1.30 (0.52-3.21)
Stage of cancer	I	13-Sep	1
	II	29-May	6.22 (1.10-35.14)
	III	48/15	1.68 (0.37-7.63)
	IV	89/12	4.71 (1.08-20.57)

Nutrition route	Oral feeding	160/41	1
	Feeding tube	19/0	-
Gastrointestinal symptoms	No	Apr-16	1
	Yes	175/25	49.18 (10.40-232.58)
Food preparation	Hospital diet	38/10	1
	Self-cooked	111/28	0.68 (0.18-2.49)
	Order outside	16-Jan	6.31 (0.34-117.99)
	Others	14-Feb	1.01 (0.16-6.27)
Weight change in 01 month	No change/Weight gain	42/14	1
	Lose 1-5%	56/15	0.30 (0.08-1.06)
	Lose 5-10 %	24-Feb	0.12 (0.02-0.99)
	Lose >10%	13-Jan	0.40 (0.02-8.62)
Weight change in 06 months	No change/Weight gain	17-Nov	1
	Lose 1-5%	40/15	1.53 (0.43-5.43)
	Lose 5-10 %	52/4	13.43 (2.35-76.62)
	Lose >10%	26-Feb	19.86 (1.73-28.16)

Note: (*) The model controls variables consisting of gastrointestinal symptoms, weight change in 01 month, cancer types, age groups, weight change in 06 months; PG-SGA group A: no malnutrition risk, PG-SGA groups B and C: moderate and severe malnutrition risk.

Table 5: Relationship between pathological factors and the underweight risk in cancer patients according to BMI.

Pathological factors		BMI (<18,5/ ≥ 18,5)	
		MR/ No MR	OR* (95%CI)
Treatment method	Surgery	14/59	1
	Radiation therapy	37/110	1.23 (0.56-2.73)
Stage of cancer	I	Jun-16	1
	II	Jun-28	0.53 (0.12-2.36)
	III	Nov-52	0.58 (0.15-2.20)
	IV	28/73	0.84 (0.25-2.90)
Nutrition route	Oral feeding	45/156	1
	Feeding tube	Jun-13	0.74 (0.20-2.72)
Gastrointestinal symptoms	No	Apr-16	1
	Yes	47/153	0.59 (0.15-2.36)
Food preparation	Hospital diet	Sep-39	1
	Self-cooked	30/109	1.09 (0.41-2.89)
	Order outside	09-Aug	6.67 (1.68-26.44)
	Others	Mar-13	0.51 (0.09-2.87)
Weight change in 01 month	No change/Weight gain	15/59	1
	Lose 1-5%	13/80	0.52 (0.20-1.38)
	Lose 5-10 %	Nov-22	0.81 (0.25-2.59)

	Lose >10%	12-Aug	1.35 (0.31-5.88)
	No change/Weight gain	Apr-35	1
Weight change in 06 months	Lose 1-5%	Aug-62	1.08 (0.29-3.99)
	Lose 5-10 %	17/56	2.92 (0.87-9.80)
	Lose >10%	22/16	16.56 (4.53-60.48)

Note: (*) The model controls variables including gender, race, education level and weight change within 6 months, BMI≥ 18.5: normal-weight or overweight, BMI <18.5: underweight.

Discussion

The research conducted on 220 patients with oral cavity cancer. According to research findings, 63.2% of patients were at risk of mild and moderate malnutrition, 18.2% were at risk of severe malnutrition which were higher than what had been stated in the study of the authors Phan Thi Bich Hanh (2017) (51.7%) [11]. The main reason for the discrepancy is: Our studied subjects are of oral cavities group- the first part of the alimentary canal, which are dissimilar to that of two mentioned researches (all cancers). Particularly, with oral cavity cancer, its pathological symptoms such as mouth sores, no appetite, problems swallowing, etc. do cause a remarkable impact on oral feeding ability of patients, from which the food intake can be limited then leads to higher possibility of malnutrition risk in contrast to other cancer group [11,12]. In comparison with other international studies, the ones in the U.K, Australia, and China represent that the proportions of patients with high malnutrition risk were 71%, 76%, 48.2%, respectively [12-14]. This once again emphasizes that gastrointestinal cancer suffers are prone to nutritional deficiency.

Unintended weight loss of patients is worth noting: the percentage of patients losing 1-5%, 5-10% and more than 10% within 1 month were 42.5%, 15.6% and 8.4%, accordingly. The findings of this study were similar to those of Pirus Ghadjar (65.2%) and higher than the 2013 study of radiotherapy head and neck patients [15,16]. Especially, by contrasting weight changes between 01 month and 06 months, there was a shift from the marginal weight loss group to the considerable one (within 6 months, 32.9% of patients lost 1-5 %, 33.5% lost 5-10%, 16.8% lost more than 10%). This could be explained by the fact that unintended weight loss associated with cancer is distinct from weight loss due to lack of food/ fasting [17-19].

There are a variety of variables affecting the weight loss of cancer patients. Such causes may include: reduced food intake, mal-absorption, increased basal metabolic energy, side effects of treatment or the tumor itself producing substances that elevate the protein lysis [19]. The malnutrition situation of patients is likely to escalate over time, even when receiving treatment, such that the quality of treatment is directly affected [15,20]. However, if taken care of, the malnutrition situation will be significantly improved. A study on patients with head and neck cancer with radiation therapy monitored for 9 years indicated that the group of patients who received enough energy ($\geq$ 35kcal and $\geq$1.5g protein/kg/day) encountered less weight loss and muscle mass than the group that did not [16].

Pathological characteristics, nutrition routes, food preparation methods are fundamental factors uplifting the danger of malnutrition in patients. In particular, pathological features comprise such factors: stage of cancer, treatment method, unintended weight loss and gastrointestinal symptoms. In terms of the stage of disease, according to the research results, when the subjects are in stage IV, the risk of malnutrition goes up by approximately 5 times compared to those in stage I (OR(95% CI):4.71(1.08-20.57)). This could be explained by the fact that: in the late stages of disease, ulcerative lesions of the cancer cause a direct impact on the patients' consumption ability since the oral cavity is the gateway of the digestive tract; thus, any lesions triggering pain, compression, reduction or loss of taste are reasons reduced food intake, and thereby leads to malnutrition [21]. Once malnutrition becomes more severe, the mortality rate will inevitably rise [22].

Regarding treatment methods, the research results illustrate that both chemotherapy and surgical chemotherapy patients were at high risk of malnutrition, particularly the radiotherapy group with 84.3% being the cases. The study in 2015 on patients with head and neck cancer treated with radiotherapy demonstrates that the impact of radiotherapy was undoubtedly the increase in the proportion of patients suffering >5% weight loss during the treatment [22]. The research also shows similar results with a half of the patients shedding a moderate number of kilograms after radiation therapy, 5.1 ± 4.9% of their weight on average [23]. Thus, treatments, especially radiotherapy, have a great influence on weight loss and malnutrition, thereby worsen the quality of life and prognosis of patients with oral cavity cancer [24-26].

More importantly, the unintended weight loss in 6 months plays a vital role in increasing the malnutrition rate. Research results indicate that for 5-10% weight loss group, the risk of malnutrition increases 13 times higher than no weight loss/ weight gain (OR(95% CI):13.43(2.35-76.62)); for over 10% weight loss, the risk increases roughly by 20 times (OR(95% CI):19.86(1.73-228.16)). Over 5% weight loss in 1 month and over 10% in 6 months are the common symptoms in cancer patients with the proportion ranging from 30 to 55% in head and neck cancer patients [27-29]. This condition not only heightens the rate of complications but also inhibits the effectiveness of surgery, radiotherapy and chemotherapy [30]. While there have not been adequate studies to compare the

level of increased risk, the findings of the study suggest that special attention should be paid to the weight changes of oral cancer patients in terms of prognosis and treatment, even when the malnutrition has not been diagnosed. Concerning gastrointestinal symptoms, patients who develop these symptoms are roughly 50 times more likely to suffer from malnutrition than those without (OR(95% CI): 49.18(10.40-232.58)). The explanation for this could be: the gastrointestinal-related symptoms such as anorexia, fatigue, taste disorder, pain, etc. are closely associated with weight loss in cancer patients which is considered to be an immediate cause of malnutrition. For that reason, the emergence of gastrointestinal-related signs also greatly raised the likelihood of malnutrition.

Also according to the research findings, patients ordering food outside are 7 times more likely to be underweight than those who incorporate the hospital diet (OR(95% CI): 6.67(1.68-26.44)). This situation could be explained by the fact that the vast majority of Vietnamese foods do not satisfy the requirements on energy, micronutrients and food safety [31]. Meanwhile, a balanced diet with a sufficient amount of vegetables and fruits controlled by nutritionists will help lower the risk of contracting diseases and malnutrition in patients with oral cavity cancer. Several reports have found that each serving of fruits and vegetables on a daily basis reduces the risk of oral cancer by 49%. On the contrary, using processed food increases the risk of oral cavity cancer (RR(95% CI): 1.91(1.19-3.06)) [32]. Meanwhile, the diets of most Vietnamese citizens are seriously lacking the quantity of vegetables and fruits, whereas the consumption of processed meat is on the increase [33,34]. Therefore, a specialized and comprehensive nutrition care should be designed and given to patients, especially hospitalized cancer patients. Moreover, it is essential to spread foundational messages for the general public to get the correct perception about the necessary nutrition diet for cancer prevention as well as treatment.

Conclusion

Oral cavity cancer patients posed a significant chance of malnutrition. Patients in late stage of disease, weight loss, gastrointestinal symptoms and non-compliance with pathological nutrition care were at greater risk of malnutrition than most cases. Therefore, Nutrition management in patients with oral cavity cancer is very important.

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