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Nutritional status and quality of life of the gastric cancer patients in Changle County of China

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Abstract

AIM: To analyze the relation between nutrition and quality of life in the stomach cancer patients, evaluate the intake of daily nutrition of the patients, and study the feasibility of nutrition intervention in improving quality of life of the stomach cancer patients.

METHODS: A total of 285 surgical stomach cancer patients reported in the Changle Cancer Registry from 2002 to 2003 were investigated with respect to their diet and quality of life. Daily nutrition intakes of the patients were calculated according to the Food Composition Database, and these data were compared with the reference values proposed by the Chinese Nutrition Society. The partial correlation was used to analyze the relationship between nutrition and quality of life in the patients. Stepwise multiple regression analyses were conducted to analyze the factors influencing nutrition intake in stomach cancer patients.

RESULTS: Except vitamin C, there were statistical correlations between the nutrition and quality of life in stomach cancer patients, and differences of the daily nutrition intake among three groups (good, modest and bad quality of life) of the patients were significant. Most of the stomach cancer patients had a lower daily nutrition intake than the reference values. At the significance level $\alpha = 0.05$, the factors influencing the daily nutrition intake of the patients were number of meals a day, family income, way of operation, exercise and age.

CONCLUSION: The nutritional status of the operated patients with stomach cancer may impact on their quality of life. The stomach cancer patients in Changle County have a low level of daily nutrition intake, which suggests that they have a bad nutritional status. To improve the quality of life of the patients, the nutrition intervention should be conducted. Increasing times of meals a day and having a high-protein, high-calorie foods can improve the nutritional status of the stomach cancer patients. Moreover, exercise for rehabilitation can whet the appetite of the patients and recover their body function, which in turn may improve the quality of life of the stomach cancer patients.

Key words: Nutrition; Quality of life; Stomach cancer

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INTRODUCTION

Changle County is a high-incidence area of gastric cancer in Fujian Province. On an average, about 500 cases were operated a year in Changle County. Along with the increase in the patients with early stage and improvement in tumor treatment, the survival time of the patients with stomach cancer has been prolonged[1]. As there are more and more stomach cancer patients in the communities, how to make the stomach cancer patients rehabilitate and how to improve their quality of life, are important research contents. We had conducted the studies of the influencing factors on the quality of life of the stomach cancer patients in Fuzhou City and Changle County during 1998-2002. The results of these researches suggested that most of the gastric cancer patients had poor quality of life and the rural patients had lower quality of life than those of urban patients. Moreover, there were three aspects of factors, including the disease conditions, the social-economic status and rehabilitation status, influencing the quality of life of the stomach cancer patients[2], and their weights on quality of life were 0.35, 0.32, 0.33, respectively, and whether increasing nutritious food played an important role in rehabilitation status of the patients[2]. Increasing nutritious food in diet had effect not only on patients' physiological state, but also on their psychological state[3]. These results suggested that when seeking the countermeasure improving the quality of life of the stomach cancer patients, we should not neglect to study their nutritional status. Because the disease conditions and social-economic status of the patients cannot be changed, their quality of life may be improved by changing their nutritional status. Because our early studies only asked the patient whether to increase nutritious food or not (yes or no), there were some defect the information on the patient's nutrition intake. In order to quantitatively analyze

the association between nutrition intake and quality of life and to study the feasibility of nutrition intervention in improving the quality of life of the stomach cancer patients, we made an epidemiological survey during springtime in 2004. In this paper, we further quantitatively analyzed the relation between nutrition and quality of life among the stomach cancer patients in Changle County, evaluated the nutritional status of the patients and analyzed the influencing factors of the daily nutrition intake of the patients. The results of our research may be useful to doctors and nurses in the community health centers to help improve the quality of life of the gastric cancer patients.

MATERIALS AND METHODS

Materials

The stomach cancer patients who underwent operation in 2002-2003 and were still alive during the term of investigation in Changle County were the subjects of our research. The name and address list of the subjects were obtained from the tumor registration office in Changle City. The patients aged over 80 years or not finishing the questionnaires were rejected, so our study sample consisted of 285 patients. In the five age-groups, <40, 40-, 50-, 60- and 70-80 years, there were 8 (2.81%), 32 (11.23%), 84 (29.47%), 92 (32.28%) and 69 (24.21%) patients, respectively. There were 231 males with age (60.96±12.65) years and 54 females with age (58.67±15.39) years in our sample.

Methods

The epidemiological survey was conducted from April to May in 2004. The data were collected by means of the investigators going into the homes of the stomach cancer patients. The quality of life within two weeks was measured with a 21 items scale, with the Cronbach coefficient $\alpha = 0.9866$, and each of the 21 items was scored from 1 to 5. The higher score of the item is, the better the function corresponding to the item is. The total score of the quality of life was the sum of the scores of these 21 items.

The food frequency survey method[4] was used to obtain information about the diet for every patient within two weeks. Daily the ten kinds of nutrition intake for every patient were calculated according to the Food Composition Database[5]. On the basis of the reference values proposed by the Chinese Nutrition Society[5], the nutritional status of the patients was evaluated.

The partial correlation[6] and analysis of variance were used to analyze the relationship between nutrition and quality of life of the patients. The *u* test was used to compare the means of daily nutrition intake of the patients to the reference values. The stepwise multiple regression analyses were conducted to analyze the factors influencing nutrition intake of the stomach cancer patients. SAS software package was used for all analyses[7].

RESULTS

Status of quality of life of the stomach cancer patients

The distribution of the total score of the quality of life for 285 patients was shown in Table 1. Compared with that in 1999, the quality of life of the patients improved a little. However, the average of the total score of the quality of life was 65.69 (96%CI: 64.44-66.94), which was not statistically higher than that in 1999. The means of the total score of the quality of life for male and female were 66.9 (SD = 10.30) and 60.50 (SD = 11.22), respectively. This difference was significant ($P<0.05$).

Table 1 Distribution of the total score of the quality of life in the patients

Total score of quality of life	2002–2003		1999	
	Number of patients	%	Number of patients	%
<30	2	0.7	4	2.00
30-	1	0.35	6	3.00
40-	15	5.26	16	8.00
50-	55	19.30	54	27.00
60-	112	39.30	69	34.50
70-	71	24.91	41	20.50
80-	23	8.07	10	5.00
90–105	6	2.11	0	0.00

Relation between nutrition and quality of life

The Pearson partial correlation coefficients between daily nutrition intake and quality of life, adjusted for age, sex, way of operation and exercise, were shown in Table 2. Except vitamin C, each of the nutrition was positively correlated with the quality of life.

Table 2 Partial correlation analysis between nutrition intake and quality of life

Nutrition	*r*	*P*	Nutrition	*r*	*P*
Calorie	0.22	0.0002	Selenium	0.24	<0.0001
Protein	0.25	<0.0001	Thiamine	0.21	0.0004
Calcium	0.21	0.0004	Riboflavin	0.25	<0.0001
Iron	0.19	0.0012	Niacin	0.25	<0.0001
Zinc	0.24	<0.0001	Vitamin C	0.05	0.3891

A total number of 231 patients were grouped according to their total score of the quality of life. There were three groups: the quality of life was bad (the total score was under 60), modest (the total score was within 60-80) and good (the total score was over 80). The means of daily nutrition intake in each of the groups for male and female were calculated and shown in Table 3. For both male and female, the daily nutrition intake among three groups, except vitamin C, were statistically different, which suggested that the patients who had a better nutritional status had a higher quality of life.

Nutrition intake of the patients

There were 7 patients (2.5%) whose 10 kinds of nutrition all come to or more than the reference values, 51 patients (17.9%) whose 10 kinds of nutrition all lower than the reference values. The proportions of the patients whose

Table 3 Means of nutrition intake in three groups of the patients by sex

Nutrition mean	Total score of quality of life for male				Total score of quality of life for female			
	<60	60–80	>80	P^1	<60	60–80	>80	P^1
Calorie (kJ)	6 947.93	7 355.12	8 301.17	0.080	6 404.58	6 726.34	13 912.84	<0.001
Protein (g)	61.51	62.82	78.41	0.028	46.84	56.99	133.05	<0.001
Calcium (mg)	526.70	497.21	653.87	0.070	418.37	467.87	973.14	<0.001
Iron (mg)	21.22	20.00	27.98	0.034	15.01	18.60	46.67	0.002
Zinc (mg)	12.78	12.71	18.38	0.002	10.24	12.54	23.70	0.025
Selenium (μg)	24.33	24.98	30.74	0.028	20.38	23.89	40.58	0.122
Thiamine (mg)	1.48	1.57	1.82	0.045	1.35	1.42	2.76	0.007
Riboflavin (mg)	1.41	1.41	1.88	0.015	1.06	1.36	3.02	0.001
Niacin (mg)	11.72	13.36	16.39	0.036	10.89	12.45	27.35	0.007
Vitamin C (mg)	94.95	79.87	98.03	0.551	69.99	81.91	95.31	0.865

[1]*P* value derived from the analysis of variance among three groups.

daily nutrition intake were less than the reference values were 83.86% for calorie, 33.33% for protein, 66.67% for calcium, 35.79% for iron, 71.58% for zinc, 95.44% for selenium, 31.58% for thiamine, 45.26% for riboflavin, 51.93% for niacin and 53.33% for vitamin C, respectively, which suggested the bad diet and nutritional status of the stomach cancer patients. From Table 4, it could be seen that the intakes of calorie, protein, calcium and selenium were much lower than the reference values.

Table 4 Means of daily nutrition intake in the 285 patients

Nutrition	Male (n = 231)		Female (n = 54)	
	Reference value	mean±SD	Reference value	mean±SD
Calorie (kJ)	10 080	7 470.08 (2 722.52)[a]	8 820	6 900.39 (2 684.72)[a]
Protein (g)	70	65.37 (34.12)[a]	65	56.79 (30.21)[a]
Calcium (mg)	800	528.05 (385.61)[a]	800	509.73 (498.37)[a]
Iron (mg)	12	21.54 (17.44)[a]	18	18.57 (12.38)
Zinc (mg)	15	13.70 (9.42)[a]	15	12.27 (6.81)[a]
Selenium (μg)	50	25.90 (12.68)[a]	50	23.46 (13.30)[a]
Thiamine (mg)	1.2	1.60 (0.64)[a]	1.1	1.45 (0.62)[a]
Riboflavin (mg)	1.2	1.49 (0.93)[a]	1.1	1.34 (0.74)[a]
Niacin (mg)	12	13.69 (7.95)[a]	11	12.54 (7.14)
Vitamin C (mg)	60	84.86 (107.39)[a]	60	78.81 (83.93)

[a]P<0.05. *vs* reference value.

Factors influencing on nutrition intake of the patients

For each of the patient, his nutritional score was defined as the number of nutrition whose daily intakes were no less than the reference values. The stepwise regression analysis was conducted with the dependent variable as the patient's nutritional score and independent variables as sex (male 1, female 2), age, education (primary school 1, middle school 2, high school 3 and university 4), family income, way of operation (total gastrectomy 1, partial gastrectomy 2), times of meals a day and exercise (no 1, sometimes 2 and often 3).

At the significance level $\alpha = 0.05$, the factors influencing the nutritional status of the patients were age, family income, way of operation, times of meals a day and exercise (Table 5). According to the standard parameter estimate, times of meals a day had the most effect on the patients' nutritional status, and then in turn were family income, way of operation, exercise and age. The patients who had more times of meals a day, more family income and often taking part in exercise had a better nutritional status than those who had less times of meals a day, less family income and not taking part in exercise. Besides, total gastrectomy made the patients have worse nutritional status, and the older the patient was, the worse his nutritional status was.

Table 5 Result of stepwise regression at α = 0.05

Factor	Standard parameter estimate	Standard error	t	P
Age (yr)	-0.119	0.012	-2.12	0.035
Family income	0.206	0.142	5.71	<0.001
Way of operation	-0.151	0.366	-2.75	0.007
Times of meals a day	0.241	0.164	4.12	<0.001
Exercise	0.139	0.376	2.38	0.018

Table 6 Means of daily nutrition intake by way of operation

Nutrition	Total gastrectomy		Partial gastrectomy (n = 200)
	Times of meals (d) ⩽3 (n = 44)	Times of meals (d) ⩾4 (n = 41)	
Calorie (kJ)	5 553.66	7 394.73	7 759.08
Protein (g)	46.26	65.04	67.39
Calcium (mg)	406.13	536.43	548.50
Iron (mg)	15.13	22.03	22.06
Zinc (mg)	10.11	14.11	14.03
Selenium (μg)	20.36	26.76	26.10
Thiamine (mg)	1.17	1.63	1.72
Riboflavin (mg)	1.09	1.43	1.55
Niacin (mg)	9.71	14.16	14.17
Vitamin C (mg)	57.41	88.66	89.35

The patients who underwent total gastrectomy were grouped by the times of meals a day: one group had the times of meals a day less than or equal to three, and the other group had the times of meals a day more than or equal to four. The means of daily nutrition intake for both the groups of the patients and for the patients who underwent partial gastrectomy were shown in Table 6. From Table 6, we could see that means of daily nutrition intake in the total gastrectomy group which had the times of meals

a day more than four were close to those in the patients who underwent partial gastrectomy, which suggested that although the way of operation was the factor influencing the patient's nutritional status, the differences of daily nutrition intake between total gastrectomy and partial gastrectomy patients could be decreased by increasing the times of every day meals. Now that 62.11% of the patients had their meals no more than three times a day in our sample, increasing times of every day meals might be with great potential for improving the nutritional status of the stomach cancer patients in Changle County.

DISCUSSION

The results of our earlier research showed that the patients who often noticed to increase nutritious food in their diet had a better quality of life. However, the results of the researches on relationship between nutrition and quality of life were not consistent. Most of the researchers suggested that nutritional status of the cancer patients impacted on their quality of life[8,9,12,16-18]. Some researchers suggested that although cancer stage was the major determinant of patients' quality of life, nutritional deterioration combined with deficiencies in nutritional intake might be more important factors for the quality of life of the cancer patients[8]. Nutrient depletion adversely affects immune function, the patient's enjoyableness and social interactions with family and friends, which can further depress appetite[9]. Low hemoglobin levels were associated with fatigue, poor overall quality of life and decreased ability to work. Interventions that reverse fatigue and other anemia-related symptoms should have a positive effect on the quality of life[11]. However, some researchers have not found the statistical differences of the quality of life among the cancer patients with variant nutritional status, and there were little correlation between the quality of life and malnutrition[19-21]. In our present research, the results showed that the daily nutrition intake was different among the patients with variant quality of life, and it was positively correlated with the quality of life.

Our results showed that the stomach cancer patients in Changle County had a low nutrition intake. Most of them had a far lower daily nutrition intake than the reference values proposed by the Chinese Nutrition Society, especially for calorie and protein. Nutritional intake was associated with nutritional status of the cancer patients[22], so it could be inferred that the nutritional status of the stomach cancer patients in Changle County was bad. Some researchers have suggested that malnutrition has a significant impact on the survival of the cancer patients, and malnourished patients have depressed immune systems, which lead to unimpeded tumor growth[22]. Besides, under-nutrition or cachexia was the major cause of death in 1% of cancer patients[23,24]. Some researches on the survival of the head and neck cancer patients showed that patients supplemented with nutrition not only had a better quality of life[25], but tended to live longer also[22,26]. Protein-calorie malnutrition influenced functional status (eating, personal hygiene and toilet use) and psychosocial well being (initiative or involvement, unsettled relationships and past roles)[16,25-30]. The stomach cancer patients often have many difficulties in eating because of the operation, and disease and treatment make them lose appetite also, so the nutritional status of the stomach cancer patients is not good in general. Therefore, communal care for the stomach cancer patients is especially important. The health care services in the community should offer nutritional counseling to the patients and their nursing staff, encourage the patients to eat more than three times every day and have a balanced diet with emphasis on high-protein, high-calorie foods.

In summary, our data obtained by epidemiological survey have shown that the nutritional status of the operated patients with stomach cancer may impact on their quality of life. The stomach cancer patients in Changle County have a low level of daily nutrition intake, which suggests that they have a bad nutritional status. To improve the quality of life of the patients, the nutrition intervention should be conducted. Increasing times of meals a day and having high-protein, high-calorie foods can improve the nutritional status of the stomach cancer patients. Moreover, exercise for rehabilitation can whet the appetite of the patients and recover their body function, which in turn may improve the quality of life of the stomach cancer patients.

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