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The primary aim of *World Journal of Gastrointestinal Surgery* (WJGS, *World J Gastrointest Surg*) is to provide scholars and readers from various fields of gastrointestinal surgery with a platform to publish high-quality basic and clinical research articles and communicate their research findings online.

WJGS mainly publishes articles reporting research results and findings obtained in the field of gastrointestinal surgery and covering a wide range of topics including biliary tract surgical procedures, biliopancreatic diversion, colectomy, esophagectomy, esophagostomy, pancreas transplantation, and pancreatectomy, *etc.*

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Case Control Study

Multidisciplinary diagnosis and treatment nutritional support intervention for gastrointestinal tumor radiotherapy: Impact on nutrition and quality of life

Lin Hui, Ying-Ying Zhang, Xiao-Dan Hu

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Abstract

BACKGROUND

Gastrointestinal tumors are a major cause of cancer-related deaths and have become a major public health problem. This study aims to provide a scientific basis for improving clinical treatment effects, quality of life, and prognosis of patients with gastrointestinal tumors.

AIM

To explore the clinical effect of the multidisciplinary diagnosis and treatment (MDT) nutrition intervention model on patients with gastrointestinal tumors.

METHODS

This was a case control study which included patients with gastrointestinal tumors who received radiotherapy at the Department of Oncology between January 2021 and January 2023. Using a random number table, 120 patients were randomly divided into MDT and control groups with 60 patients in each group. To analyze the effect of MDT on the nutritional status and quality of life of the patients, the nutritional status and quality of life scores of the patients were measured before and after the treatment.

RESULTS

Albumin (ALB), transferrin (TRF), hemoglobin (Hb), and total protein (TP) levels significantly decreased after the treatment. The control group had significantly

lower ALB, TRF, Hb, and TP levels than the MDT group, and the differences in these levels between the two groups were statistically significant ($P < 0.05$). After the treatment, the MDT group had significantly more well-nourished patients than the control group ($P < 0.05$). The quality of life total score, somatic functioning, role functioning, and emotional functioning were higher in the MDT group than in the control group. By contrast, pain, fatigue, nausea, and vomiting scores were lower in the MDT group than in the control group ($P < 0.05$).

CONCLUSION

MDT nutritional intervention model effectively improves the nutritional status and quality of life of the patients. The study provides a rigorous theoretical basis for improving the prognosis of cancer patients. In the future, we intend to provide additional treatment methods for improving the quality of life of patients with cancer.

Key Words: Nutritional support; Gastrointestinal tumor; Radiotherapy; Nutrition; Quality of life; Multidisciplinary diagnosis and treatment intervention

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Core Tip: The multidisciplinary diagnosis and treatment nutritional intervention model significantly improved the nutritional status and quality of life of patients with gastrointestinal tumors undergoing radiotherapy. This study provides evidence for the implementation of comprehensive nutritional support strategies to enhance treatment outcomes and patient well-being.

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INTRODUCTION

Gastrointestinal tumors contribute to a significant proportion of cancer-related deaths, mainly gastrointestinal cancers such as esophageal, gastric, colon, and rectal cancers[1]. The 2020 WHO data revealed that colorectal and stomach cancers are the third and fifth most prevalent cancers[2]. Therefore, the treatment and prognosis of gastrointestinal tumors remain a current healthcare concern. Most patients undergoing radiotherapy for the digestive tract experience malnutrition[3]. Because of the effects of chemotherapy, most patients experience nausea, vomiting, appetite loss, and other clinical symptoms during treatment, which further aggravate appetite loss in patients[4-6]. Malnutrition may also aggravate the risk of toxic reactions, affecting the patient's clinical outcome, which in turn affects the quality of life and survival prognosis of the patients[1,7].

Multidisciplinary diagnosis and treatment (MDT) refers to a patient-centered, multidisciplinary, team-based, and comprehensive intervention and treatment plan for a particular disease. MDT is of remarkable significance for the clinical diagnosis and prognosis of malignant tumors[8]. An MDT concept-based personalized care model is effective for the clinical treatment of breast cancer. It improves the patients' quality of life and alleviates anxiety and depression[9]. The MDT model has been considered the preferred treatment modality for patients with laryngeal cancer[10]. Recent studies have shown that MDT can also be better applied in gastrointestinal cancers. For example, a previous meta-analysis concluded that the clinical therapeutic effect of MDT depends on the tumor type and disease stage. MDT has the most significant clinical therapeutic effect in patients with low-stage tumors. However, studies investigating the effects of MDT in patients with gastrointestinal tumors who are receiving radiotherapy are rare. Most of these studies have only focused on the effect of treatment in the perioperative period of patients with gastrointestinal tumors, whereas those focusing on the radiotherapy period are fewer.

Based on previous studies, the present study adopted the MDT nutritional intervention model as nutritional adjuvant therapy for patients with gastrointestinal tumors undergoing radiotherapy. In this case-control study, 120 patients receiving radiotherapy were included as study participants to explore the clinical effects of the MDT nutritional support intervention model on their nutritional status and quality of life of the patients. Thus, this study provides a scientific basis for improving clinical treatment effects, quality of life, and prognosis of patients with gastrointestinal tumors.

MATERIALS AND METHODS

Research participant

The study participants included patients with gastrointestinal tumors who underwent radiotherapy in the Department of Oncology between January 2021 and January 2023. Using a random number table, 120 study participants were randomly divided into the MDT and control groups (each group: 60 participants).

Patients: (1) Aged > 18 years; (2) clinically diagnosed as having digestive tract tumors on the basis of the diagnostic criteria; (3) who met the criteria for chemotherapy treatment, as determined by two attending physicians; and (4) who gave consent to the research project by signing an informed consent form were included in the study. Written informed consent was also obtained from the patient families.

Patients: (1) With cognitive impairment, psychiatric disorders, and an inability to provide clear answers; (2) allergic to nutritional drugs; (3) having a combination of severe hepatic and renal diseases; (4) having a combination of tumors in other systems; and (5) who could not undergo follow-up observation were excluded from the study.

Research design

The MDT for digestive system tumors at our hospital was discussed with all the patients, and a radiotherapy plan was formulated. The need for concurrent chemotherapy and radiotherapy was determined based on the patient's age, tumor type, underlying disease status, and physical strength score. The chemotherapy regimen included 850-1250 mg/m² capecitabine administered orally twice daily on days 1-14, which was repeated every 3 wk for 8 cycles. Based on tumor type and stage, three methods of external irradiation, intracavitary, and combined radiotherapy were selected.

In the MDT group, the MDT nutritional support model was used as an intervention to improve the patients' nutritional status. (1) An MDT team comprising a nurse manager, two oncology specialist nurses, two gastrointestinal oncologists, nutritionist, pharmacist, and behavioral interventionist was formed. Before the study commencement, a nutritional assessment was conducted by a dietitian to determine the patient's nutritional status and developed a nutritional program. Patients who could not intake oral nutritional agents after the assessment were provided with nutrition through a gastric tube. Specialist nurses dispensed daily medications and instructed the family members to implement nutritional interventions for the patients. The pharmacist managed the patient's medication, and the behavioral interventionist provided psychological and behavioral interventions; (2) During radiotherapy, the patients underwent weekly nutritional assessment for 12 wk, that is, three treatment cycles. The patients received a daily nutritional intake of 20-35 kcal/kg, and the daily consumption of the three major nutrients was 1.2-2.0 g/kg for protein, 1.0-1.3 g/kg for fat, and 3.0-5.0 g/kg for carbohydrates. Meanwhile, the dietitian monitored and recorded the patient's body mass index and nutritional scores, as well as the presence of metabolic diseases such as diabetes and hyperlipidemia, to adjust the nutritional preparations; and (3) The MDT nutritional intervention was maintained for at least 3 mo after radiotherapy, depending on the patient's weight, nutritional score, response to radiotherapy, and the presence of diabetes.

The control group did not receive guidance from professional dietitians, and an MDT team was not formed for this group to formulate a systematic nutritional support program. During hospitalization, the attending physician was responsible for the daily diet and nutritional plan for the control group, and if the patients were judged unable to eat on their own, they were administered a short-term intravenous nutrient drip.

Nutritional status assessment

Nutritional status was assessed using the 2002 Nutritional Risk Screening (NRS) and Patient-Generated Subjective Global Assessment (PG-SGA) scales. The NRS scale consists of four parts: (1) Basic nutritional information of the patient including height, weight, and albumin (ALB), transferrin (TRF), hemoglobin (Hb), and total protein (TP) levels; (2) a score of the patient's disease status; (3) a score of the patient's nutritional status; and (4) a score of the patient's age. A defined score of > 3 was considered a nutritional risk, and nutritional intervention was deemed necessary. The PG-SGA scale consists of three grades (A, B, and C) based on which patients self-assess their nutritional status. The indicators of assessment include recent weight changes, dietary changes, gastrointestinal symptoms, changes in mobility, stress response, muscle wasting, triceps skinfold thickness, and ankle edema. Based on the overall scale score, three grades existed: nutritional status A = 0-1, representing good nutritional status; nutritional status B = 2-8, representing mild/moderate malnourishment; and nutritional status C > 9, representing severe malnourishment.

Quality of life assessment

The quality of life of the patients was assessed using The European Organization for Research and Treatment of Cancer (EORTC) QLQ-C30 (version 3) quality of life questionnaire developed by the EORTC. The EORTC QLQ-C30 scale has been used to measure the quality of life of cancer patients in several European countries and regions. The scale consists of three dimensions, namely the symptom scale, functioning scale, and overall quality of life, with a total of 30 items. The higher the score, the worse the patient's quality of life.

Statistical analysis

Data were statistically analyzed using the SPSS software (version 26.0). Continuous data were normally distributed and presented as means and percentages. The median (interquartile range) was used to describe continuous variables with skewed distributions, and categorical variables were presented as numbers and percentages (%). Differences in quantitative data between the two groups were analyzed using *t*-tests. Multiple groups of data were analyzed using the chi-squared test. All analyses were performed with a test level of $\alpha = 0.05$, and differences were considered statistically significant at $P < 0.05$.

RESULTS

Participant characteristics

The statistical analysis of the basic patient information revealed no statistical differences between the two groups in terms of sex, age, degree of tumor differentiation, number of simultaneous chemotherapy treatments, tumor type, and lymph node metastasis before receiving the treatment ($P > 0.05$; Table 1).

Nutritional status assessment

The analysis compared ALB, TP, Hb, and TRF levels in the two patient groups before and after treatment. No significant difference was observed between the two patient groups before the treatment ($P > 0.05$). The ALB, TRF, Hb, and TP levels significantly decreased after eight weeks of treatment. The control group had significantly lower ALB, TRF, Hb, and TP levels than the MDT group, and the differences in these levels between the two groups were statistically significant ($P < 0.05$; Tables 2 and 3).

Autonomous scoring of patients' nutritional status before and after the treatment revealed no significant difference in the PG-SGA nutritional status between the MDT and control groups before the treatment ($P > 0.05$). By contrast, after the treatment, the MDT group had significantly more well-nourished patients than the control group ($P < 0.05$; Table 4).

Quality of life assessment

Table 5 presents the difference in the quality of life scores between the two groups before and after the treatment. No significant difference was observed in each score between the two groups before the treatment ($P > 0.05$). After the treatment, the quality of life total score, somatic functioning, role functioning, and emotional functioning were higher in the MDT group than in the control group. By contrast, pain, fatigue, nausea, and vomiting scores were lower in the MDT group than in the control group ($P < 0.05$).

DISCUSSION

In our study, the MDT nutritional intervention model was effective in improving the nutritional indicators in patients with digestive tumors. It improved several functional indicators of quality of life, including somatic functioning, and reduced several symptom scores such as pain.

Nutritional status

Patients with cancer often tend to lose their appetite and exhibit a decline in nutritional status when receiving treatment. Nutritional interventions for patients with cancer has been found to have a huge impact on their therapeutic effect and quality of life[11,12]. The efficacy of the MDT model in the clinical management of patients with cancer has been demonstrated in several studies[13,14]. Findlay reported that the MDT nutritional support model plays a significant role in the clinical management of head and neck cancer, and that MDT intervention can provide optimal nutritional care for patients with cancer[14]. These results were confirmed in the present study. ALB, TRF, TP, and Hb levels are crucial indicators of nutritional status. After the patients received radiotherapy, these indicators exhibited a decreasing trend in both the MDT and control groups. However, after the treatment, a significant difference was observed between the two groups. The levels of these indicators were higher in the MDT group than in the control group. Autonomous scoring using the PG-SGA revealed higher scores in the MDT group than in the control group. The MDT nutritional intervention model involves intervention by a professional dietitian and a personalized program based on the patient's condition. This model ensures that a patient's nutritional intake is adjusted according to their underlying disease.

Quality of life

Few studies have focused on the impact of the MDT model on the quality of life of patients with gastrointestinal tumors [15,16]. By using the MDT model in the clinical treatment of lung disease, a previous study explored its impact on the quality of life. The MDT model was found to improve the prognosis and quality of life of the patients and slow disease progression. In our study, the MDT nutritional support model could improve several life functions, including somatic, role, and emotional functions. It could effectively improve pain, fatigue, nausea, and vomiting, which are the complications of radiotherapy. Cancer is considered to negatively affect the quality of life of patients and is affected by the treatment length and disease duration[17-19]. However, the MDT model can improve the quality of life and regulate the mental health of patients with gastrointestinal cancer. The MDT model involves the participation of physicians and nursing staff from multiple disciplines and comprehensively considers the quality of life of patients undergoing radiotherapy. Studies have also reported on the advantages of MDT. MDT can effectively improve the survival outcome of patients with metastatic renal cell carcinoma, and can prolong the survival of patients with metastatic prostate cancer [20].

Strengths and limitations

The strengths of this study lie in its prospective nature, which allowed observation of the changes in the quality of life and nutritional levels of patients during treatment, as well as in the comparative analyses conducted to observe the exact clinical effects of MDT. However, we could not use a large sample size in this study because of strict screening conditions for the study population. A large-scale study is required to confirm the validity of these findings.

Table 1 Characteristics of participants

Items		MDT group (n = 60)	Control group (n = 60)	Statistical value	P value
Age (yr)	≤ 65	55.58 ± 1.09	53.66 ± 1.05	1.272	0.209
	> 65	73.48 ± 0.77	73.62 ± 0.86	0.119	0.996
Sex	Male	14	16	0.067	0.796
	Female	15	15		
Simultaneous chemotherapy treatments	Yes	11	12	0.071	0.791
	No	19	18		
Tumor type	Stomach cancer	5	6	0.292	0.962
	Cancer of the esophagus	7	8		
	Intestinal cancer	12	11		
	Other cancer	6	5		
Lymph node metastasis	Yes	14	13	0.067	0.795
	No	16	17		

MDT: Multidisciplinary diagnosis and treatment.

Table 2 Differences between the multidisciplinary diagnosis and treatment and control groups in albumin/total protein

	ALB		TP	
	Before	After	Before	After
MDT group	39.83 ± 0.55	34.74 ± 0.48 ^a	66.77 ± 0.93	62.16 ± 0.70 ^a
Control group	39.65 ± 0.44	37.14 ± 0.52 ^a	67.66 ± 0.82	66.10 ± 1.00 ^a
H/t	-0.134	3.066	0.705	3.021
P value	0.893	0.002	0.481	0.003

^aP < 0.05, difference compared with that before treatment.

ALB: Albumin; TP: Total protein; MDT: Multidisciplinary diagnosis and treatment.

Table 3 Differences between multidisciplinary diagnosis and treatment and control groups in transferrin/hemoglobin

	TRF		Hb	
	Before	After	Before	After
MDT group	275.29 ± 2.03	34.74 ± 0.48 ^a	139.51 ± 1.10	121.68 ± 1.12 ^a
Control group	271.27 ± 0.44	37.14 ± 0.52 ^a	137.55 ± 1.11	130.83 ± 1.55 ^a
H	-1.066	2.569	-1.148	3.867
P value	0.286	0.010	0.251	0.000

^aP < 0.05, difference compared with that before treatment.

TRF: Transferrin; Hb: Hemoglobin; MDT: Multidisciplinary diagnosis and treatment.

CONCLUSION

This case-control study explored the clinical effects of the MDT nutritional intervention model in patients with gastrointestinal tumors who were undergoing radiotherapy. The MDT nutritional intervention model could effectively improve the nutritional status and quality of life of the patients. The study findings provide a rigorous theoretical basis for improving the prognosis of patients with cancer. In the future, we intend to provide additional treatment methods for improving the quality of life of patients with cancer.

Table 4 The difference in the Patient-Generated Subjective Global Assessment score compared between the multidisciplinary diagnosis and treatment and control groups before and after treatment

	Before PG-SGA		After PG-SGA	
	Well-nourished	Malnourished	Well-nourished	Malnourished
MDT group	7	23	13	17
Control group	8	22	4	26
Z		0.089		6.648
P value		0.766		0.010

Before Patient-Generated Subjective Global Assessment (PG-SGA) refers to before-patient treatment; after PG-SGA refers to after-patient treatment. PG-SGA: Patient-Generated Subjective Global Assessment; MDT: Multidisciplinary diagnosis and treatment.

Table 5 Quality of life difference between the multidisciplinary diagnosis and treatment and control groups

		MDT group	Control group	H/t	P value
Total score	Before	29.57 ± 0.59	30.53 ± 0.57	1.259	0.208
	After	47.90 ± 1.37	40.30 ± 1.03	3.814	0.000
Functional scale					
Somatic function	Before	68.96 ± 0.68	67.87 ± 1.40	-0.126	0.900
	After	83.23 ± 0.58	77.40 ± 0.96	4.057	0.000
Role function	Before	62.06 ± 1.74	59.93 ± 0.74	-0.051	0.959
	After	72.77 ± 1.01	69.03 ± 1.32	2.245	0.025
Emotional function	Before	47.87 ± 0.78	46.60 ± 0.67	1.235	0.222
	After	67.03 ± 1.11	55.63 ± 0.87	5.729	0.000
Cognitive function	Before	49.56 ± 0.35	49.07 ± 0.31	-1.205	0.228
	After	65.27 ± 1.21	62.90 ± 1.09	1.37	0.168
Social function	Before	53.53 ± 0.99	52.10 ± 0.88	-1.052	0.293
	After	63.13 ± 1.16	62.67 ± 1.04	0.393	0.695
Symptom scale					
Pain score	Before	69.93 ± 1.72	73.23 ± 1.67	1.442	0.149
	After	51.80 ± 1.35	64.33 ± 1.91	-4.492	0.000
Fatigue score	Before	73.63 ± 1.47	72.10 ± 1.28	1.220	0.204
	After	47.53 ± 1.58	52.70 ± 1.40	-2.020	0.043
Nausea and vomiting score	Before	54.16 ± 0.95	55.53 ± 0.82	1.246	0.213
	After	34.57 ± 0.51	45.97 ± 1.29	8.193	0.000

MDT: Multidisciplinary diagnosis and treatment.

ARTICLE HIGHLIGHTS

Research background

Gastrointestinal tumors account for a significant proportion of deaths from cancer-related diseases, and malnutrition aggravates the probability of toxic reactions, affecting the clinical outcome of patients and ultimately affecting their quality of life and survival prognosis. Multidisciplinary diagnosis and treatment (MDT) refers to a patient-centered, multidisciplinary, team-based, comprehensive intervention and treatment plan for a particular disease, and previous studies have shown that MDT has a good clinical effect on the quality of life and nutritional status of patients.

Research motivation

This study provides a scientific basis for improving the clinical treatment effects, quality of life, and prognosis of patients with gastrointestinal tumors.

Research objectives

To explore the clinical effect of the MDT nutrition intervention model on patients with gastrointestinal tumors.

Research methods

Study participants were selected from among patients with gastrointestinal tumors who underwent chemotherapy in the Department of Oncology between January 2021 and January 2023. Patients were grouped using a random number table. A total of 120 study participants were randomly divided into MDT and control groups, with 60 study participants in each group. To analyze the effects of MDT on the nutritional status and quality of life of patients undergoing radiotherapy for gastrointestinal tumors by measuring their nutritional status and quality of life scores before and after treatment.

Research results

There was a significant decrease in the levels of albumin, transferrin, hemoglobin, and total protein after treatment, and the control group had significantly lower levels than the MDT group, and the difference between the two groups was statistically significant ($P < 0.05$). However, after treatment, there were significantly more well-nourished patients in the MDT group than in the control group ($P < 0.05$). The total quality of life score, somatic functioning, role functioning, and emotional functioning in the MDT group were higher than those in the control group, and the pain, fatigue, nausea, and vomiting scores in the MDT group were lower than those in the control group ($P < 0.05$).

Research conclusions

This case-control study was conducted to explore the clinical effects of the MDT nutritional intervention model on patients undergoing gastrointestinal tumor radiotherapy. The results showed that the MDT nutritional intervention model effectively improved the nutritional status and quality of life of patients.

Research perspectives

Future research should provide alternative treatment methods to improve the clinical quality of patients with cancer.

FOOTNOTES

Co-first authors: Lin Hui and Ying-Ying Zhang.

Author contributions: In this study, Hui L and Zhang YY made equal contributions as co first authors; Hu XD was designated as the corresponding author and assumed primary responsibility.

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