



Status quo of exercise participation among gastric cancer patients after radical gastrectomy and analysis of the influencing factors

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Background: To investigate the status quo of participation in exercise among gastric cancer patients after radical gastrectomy and analyze the influencing factors.

Methods: Convenient sampling was used to conduct a questionnaire survey of 163 patients after radical gastric cancer surgery from January to December 2020. The survey content included general information, exercise participation, exercise knowledge, attitude, and social support. Descriptive statistics, single factor analysis, and multiple linear regression analysis were performed using Statistical Product and Service Solutions 24.0 (SPSS24.0, IBM, USA).

Results: After radical gastrectomy, the form of exercise that patients participated in was relatively simple. The average amount of exercise involved was 8.10 Mets-h/week, which was at the level of almost no exercise. Univariate analysis showed that differences in age, gender, education level, work status, main caregivers and sports knowledge, attitudes, and social support levels all led to different levels of exercise participation. Multiple linear regression analysis showed that the factors affecting the patient's level of participation in exercise included age, degree of self-care in life, attitude towards exercise after surgery, and level of social support.

Conclusions: The status quo of exercise participation among gastric cancer patients after radical gastrectomy is not ideal. In this study, we found that age, level of self-care in life, sports attitude, and level of social support were the main factors affecting the exercise participation of patients. Therefore, improving patients' self-care ability, exercise attitude, and increasing social support may play an important role in improving the status quo of patients' exercise participation after radical gastric cancer surgery.

Keywords: Postoperative gastric cancer; exercise; influencing factors; attitude; social support

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1 **Introduction**

2 Cancer is a major disease that affects the health of people
3 worldwide. According to the latest research on the global
4 burden of disease, gastric cancer has become one of the

top six causes of death in the Asia-Pacific region (1). At
6 present, there are approximately 952,000 new cases of
7 gastric cancer globally, with the number of new cases in
8 China accounting for approximately half (405,000), and
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10 the rates of morbidity increasing annually (2). However,
11 with the advancement of medical technology, the survival
12 rate of patients has increased substantially (3), which has
13 led to widespread attention regarding the rehabilitation of
14 patients after gastric cancer surgery. As tumor growth leads
15 to gastrointestinal dysfunction and surgical treatments cause
16 traumatic stress, most patients will have varying degrees
17 of dysfunction following radical gastric cancer surgery. In
18 particular, patients 6 months after surgery often have a high
19 frequency of symptoms, such as abdominal distension, pain,
20 loss of body mass, and fatigue (4), which may not only affect
21 their physical and mental state, but also increase the burden
22 on their families and society.

23 Preliminary studies have reported that traditional retreats
24 are questionable, and exercise therapy and clinical exercise
25 prescriptions have gradually been introduced into cancer
26 care as an adjuvant therapy (5). A large number of studies
27 at home and abroad have shown that proper and reasonable
28 exercise can relieve symptoms of physical discomfort to a
29 certain extent, improve the immunity of cancer patients,
30 and alleviate fatigue and insomnia. It can also relieve
31 patients' psychological problems and negative emotions,
32 such as anxiety and depression, thus improving their quality
33 of life (6).

34 However, current research mainly focuses on the benefits
35 of exercise rehabilitation for patients after gastric cancer
36 surgery (7), and there is a lack of systematic research to
37 measure the level of exercise participation in patients after
38 gastric cancer surgery. Due to the pathological complexity
39 of the disease itself and a series of sequelae in patients after
40 radical gastric cancer surgery, the factors affecting their
41 level of participation in exercise may be more complicated.

42 The purpose of this study is to investigate the current
43 status of exercise participation in patients after radical
44 gastric cancer surgery based on the knowledge-attitude-
45 practice pattern (8), and analyze its influencing factors,
46 so as to provide guidance and reference for the targeted
47 improvement of patients' exercise participation levels after
48 radical gastric cancer surgery.

49 We present the following article in accordance with the
50 SURGE reporting checklist (available at: <https://dx.doi.org/10.21037/apm-21-1241>).

53 **Methods**

54 **Objects**

55 Convenient sampling was used to conduct a questionnaire
56

58 survey of patients after radical gastric cancer surgery in
59 the Binhu District community, Wuxi City from January to
60 December 2020. In this study, postoperative gastric cancer
61 patients refer to patients 6 months after radical gastric cancer
62 surgery. These patients were in a relatively stable condition
63 and should have been engaging in appropriate exercises to
64 improve physical function. The inclusion criteria were as
65 follows: (I) patients with pathologically diagnosed gastric
66 cancer; (II) patients that underwent radical gastric cancer
67 surgery, and the postoperative time was over 6 months;
68 (III) patients over 18 years of age; and (IV) patients with
69 a clear consciousness, and those able to understand and
70 cooperate with this study. The exclusion criteria were as
71 follows: (I) those who received radiotherapy, chemotherapy,
72 or hormone replacement therapy within 1 month prior
73 to survey; (II) those with distant tumor metastases; (III)
74 patients with severe cognitive dysfunction and mental
75 disorders; and (IV) patients with severe cardiovascular
76 diseases or any other exercise contraindications, who
77 are not suitable for exercise. In total, 170 postoperative
78 radical gastric cancer surgery patients were enrolled, and
79 163 questionnaires were collected, with an effective recovery
80 rate of 95.9%. Informed consent was obtained from all the
81 patients enrolled in this study. All procedures performed in
82 this study involving human participants were in accordance
83 with the Declaration of Helsinki (as revised in 2013). The
84 study was approved by institutional ethics committee of the
85 Affiliated Hospital of Jiangnan University (No. LS2019043:
86 the registration number of ethics board).
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Survey tool

General information

89 The contents included socio-demographic data and disease-
90 related data of patients following radical gastric cancer
91 surgery. Socio-demographic data includes the patient's
92 age, gender, education level, work status, etc.; and disease-
93 related data includes the patient's tumor staging, number
94 of sequelae, and degree of self-care. The degree of self-
95 care in life is measured using the Activity of Daily Living
96 Scale (ADL), which comprises 10 items including eating,
97 bathing, grooming, dressing, bowel control, toileting, bed
98 and wheelchair transfer, walking on the ground, and stairs.
99 Based on the patient's need for help (or lack thereof) and
100 its degree, the ADL scale is divided into 4 grades of 15, 10,
101 5, and 0 points, with a full score of 100 points. A score of 0
102 –20 points signifies extremely severe dysfunction, that is, an
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105 inability to take care of oneself at all; a score of 21–40 points
 106 denotes severe dysfunction, which is an inability to take
 107 care of oneself; a score of 41–60 points signals moderate
 108 dysfunction, which means that the patient is able to take
 109 care of oneself basically; a score of 61–99 points signifies
 110 mild dysfunction, that is, an ability to take care of oneself
 111 almost completely; and 100 points denotes no dysfunction,
 112 which is an ability to take care of oneself completely.

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114 **Status quo of exercise participation among patients** 115 **with gastric cancer after radical gastrectomy**

116 The revised “Amateur Exercise Level Questionnaire”
 117 was used for the survey. The questionnaire was revised by
 118 Professor Kriska based on previous research results and the
 119 characteristics of mass sports in China, which is suitable
 120 for surveys of sports participation in all types of people.
 121 The questionnaire lists 40 sports items such as walking,
 122 running, mountain climbing, and biking. The respondents
 123 were required to select the items that have been done
 124 more than 10 times in the past 12 months, tick the items
 125 in the corresponding month, and fill in each item. The
 126 average exercise duration and the average frequency of
 127 exercises were recorded. The researcher then calculated the
 128 total amount of exercise engaged in by the patient based
 129 on the metabolic equivalent (MET) value of each sports
 130 event. The calculation formula was as follows: number of
 131 months × average number of monthly exercises × average
 132 exercise duration per time × MET/60 min/h/52 wk/year.
 133 According to the calculated total exercise volume (unit:
 134 Mets-h/week), the results could be divided into four levels:
 135 hardly exercise group (<10.0 Mets-h/week), low-level
 136 exercise group (10–19.9 Mets-h/week) week), medium-
 137 level exercise group (20–39.9 Mets-h/week), and high-level
 138 exercise group (≥40 Mets-h/week).

139 Since the questionnaire used in this study was adapted
 140 from a foreign questionnaire, many of the include sports
 141 are not common in China. Therefore, we made appropriate
 142 modifications and conducted expert consultation. After
 143 two rounds of expert consultation, all experts agreed
 144 that this questionnaire was suitable to survey the level of
 145 participation in exercise of patients after radical gastric
 146 cancer surgery. After adjustment, the questionnaire retained
 147 14 items. The content validity (I-CVI) of each item of the
 148 revised questionnaire was between 0.78 and 1, and the
 149 overall content validity (S-CVI) of the questionnaire was

0.97, indicating that the questionnaire had good validity. 150

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152 **Exercise knowledge, attitude, and social support level** 153 **of patients after radical gastric cancer surgery**

154 The knowledge-attitude-practice pattern proposes that
 155 knowledge is the basis of behavioral change, and belief
 156 is the driving force of behavioral change. Thus, only by
 157 understanding relevant health knowledge and establishing
 158 positive and correct beliefs is it possible to actively form
 159 healthy behaviors (8). By consulting the literature and
 160 combining the opinions of patients and related experts
 161 following radical gastric cancer surgery, the research team
 162 found that knowledge, attitudes, and social support related
 163 to exercise after radical gastric cancer surgery may have a
 164 significant influence on the patient’s exercise participation
 165 level. Therefore, we designed the knowledge-attitude-
 166 behavior questionnaire of exercise of patients after radical
 167 gastrectomy for cancer. The patient’s knowledge-attitude-
 168 behavior questionnaire conducts related investigations.
 169 This questionnaire includes three aspects: knowledge,
 170 attitude, and social support, with a total of 19 items. The
 171 total scores for each part of the questionnaire were 35,
 172 30, and 30, respectively. The criteria for evaluating the
 173 results were as follows: scores less than 60% of the total
 174 score were considered poor; scores between 60% and
 175 80% were considered good, and scores greater than 80%
 176 were considered excellent. The content validity of the
 177 questionnaire was 0.95, and the Cronbach’s α coefficient was
 178 0.94, indicating that the questionnaire had good reliability
 179 and validity, and could be used as a credible tool to evaluate
 180 the exercise knowledge, attitude, and social support level of
 181 patients after radical gastric cancer surgery.

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184 *Statistical analysis*

185 Statistical analyses were performed using Statistical
 186 Product and Service Solutions 24.0 (SPSS24.0, IBM, USA).
 187 Categorical variables were expressed as n/%, and compared
 188 by using chi-square test or Fisher’s exact test. Continuous
 189 variables were expressed as mean ± standard deviation or
 190 median (P25, P75) and compared using t test or Mann-
 191 Whitney U test. Univariate factor analysis and multiple
 192 linear regression analysis were used to identify the factors
 193 associated with exercise participation among gastric cancer
 194 patients after radical gastrectomy. A P<0.05 was considered

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Table 1 Socio-demographic data

Items	Categories	Population	Proportion (%)
Age (years)	<50	10	6.1
	51–59	16	9.8
	60–69	33	20.2
	70–79	50	30.7
	≥80	54	33.1
Educational level	Never went to school	23	14.1
	Primary school	27	16.6
	Middle school	40	24.5
	High school, technical secondary school or junior college	48	29.4
	Bachelor or above	25	15.3
Working status	Full-time	10	6.1
	Part-time	3	1.8
	Retired	134	82.2
	Unemployed	16	9.8
Monthly income (yuan)	<1,500	33	20.2
	1,500–3,000	45	27.6
	3,001–5,000	39	23.9
	>5,000	46	28.2
Marital status	Unmarried	1	0.6
	Married	128	78.5
	Divorced	4	2.5
	Widowed	30	18.4
Religious belief	Without	148	90.8
	With	15	9.2
Paying method	Urban health insurance	140	85.9
	Rural health insurance	17	10.4
	Business insurance	2	1.2
	Self-paying	4	2.5

195 statistically significant.

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Results

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General information of patients

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Socio-demographic data

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The 163 survey subjects in this study included 93 males

(57.1%) and 70 females (42.9%), with an average age of

(71.9±12.7) years (range, 32–95 years). The details are

shown in *Table 1*.

Disease-related information

The shortest disease course of patients in this study was

6 months and the longest was 12 years; 82.8% of patients

had other chronic diseases such as diabetes, hypertension,

Table 2 Disease-related information

Items	Categories	Population	Proportion (%)
Course of disease (year)	<1	7	4.3
	1–5	89	54.6
	6–9	33	20.2
	≥10	34	20.9
Number of complications	0	28	17.2
	1	92	56.4
	2	37	22.7
	3	6	3.7
Smoking	Yes	13	8.0
	No	150	92.0
Drinking	Yes	13	8.0
	No	150	92
Tumor staging	Early stage	13	8.0
	Middle stage	68	41.7
	Advanced stage	82	50.3
Primary caregiver	Spouse	39	23.9
	Child	32	19.6
	Nanny or caregiver	14	8.6
	Patient himself	78	47.9
Exercise regularly or not before the onset	>3 times per week	49	30.1
	1–2 times per week	3	1.8
	Never	111	68.1
Exercise regularly or not after the onset	>3 times per week	82	50.3
	1–2 times per week	4	2.5
	No	77	47.2

211 etc.; and 81% of patients had different degrees of
 212 dysfunction, including loss of appetite, pain, fatigue, and
 213 decreased physical fitness. The disease-related information
 214 is shown in Table 2.

215 216 Self-care degree of life

217 In this survey, 77.9% [127] patients were able to take care
 218 of themselves. Patients with mild, moderate, and severe life
 219 disorders accounted for 11.0% [18], 4.9% [8], and 6.1% [10]
 220 of patients, respectively.

221 Status quo of exercise participation

222 According to the results of the survey, it was found that the
 223 average amount of exercise for patients after radical gastric
 224 cancer surgery was 8.10 Mets-h/week, which was at the
 225 level of almost no exercise (Table 3). 226

227 In addition, our study found that the range of exercise
 228 options selected by patients was narrow and single. Except
 229 for walking, climbing stairs, and indoor activities, the
 230 number of people participating in other sports as less than

Table 3 Exercise amount of patients after radical gastrectomy

Items	Group	Population	Exercise amount (Mets-h/week), M (P25, P75)
Exercise amount	Total	163	8.1 (2.4, 18.8)
	Almost no exercise	91	3.2 (1.1, 5.8)
	Low level of exercise amount	39	15.5 (12.9, 18.1)
	Middle level of exercise amount	25	28.7 (23.3, 32.6)
	High level of exercise amount	8	53.9 (44.9, 76.9)

Table 4 The number and proportion of patients who participated in the three most common types of exercise after radical gastric cancer surgery

Items	Population	Proportion (%)
Walking	138	84.7
Climbing stairs	44	27.0
Indoor activities (standing on tiptoes, kicking, etc.)	34	20.9

Table 5 The number and proportion of patients who participated in a different number of exercise types after radical gastric cancer surgery

Number of exercise types	Population	Proportion (%)
1	100	61.3
2	50	30.7
3	11	6.7
>3	2	1.2

Table 6 Exercise knowledge, attitude and social support scores of patients after radical gastric cancer surgery

Items	Categories	Mean score, M (P25, P75)	Score/total (%)
Knowledge	Total	18 (12.0, 26.0)	51.4
	Poor	13 (10.0, 16.0)	37.1
	Good	24 (22.0, 25.8)	68.6
Attitude	Excellent	31 (30.0, 33.0)	88.6
	Total	17 (13.0, 22.0)	56.7
	Poor	13 (10.0, 15.0)	43.3
Social support	Good	20 (18.0, 22.0)	66.7
	Excellent	27 (24.8, 29.0)	90.0
	Total	17 (13.0, 21.0)	48.6
Social support	Poor	13 (11.0, 15.0)	43.3
	Good	19 (19.0, 21.0)	63.3
	Excellent	26 (25.0, 27.5)	74.3

231 20%. Approximately 92% of patients only participated
 232 in one or two sports. *Tables 4* and *5* list the three most
 233 common types of sports that patients participated in, and
 234 the number and proportion of participants in different
 235 sports, respectively.

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Patient's exercise knowledge, attitude, and social support level

The average scores of exercise knowledge, attitude, and social support of patients after radical gastric cancer surgery were 18, 17, and 17, respectively. These scores were all less than 60% of the total score, which was at a poor level. The

specific scores and classifications are shown in *Table 6*.

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Single factor analysis of exercise participation level

In order to analyze and compare the levels of exercise participation in patients of different categories, a rank-sum test was performed, with the items in the general data and the level of exercise knowledge, attitude, and social support after gastric cancer surgery used as independent variables, and the amount of exercise used as the dependent variable. As shown in *Table 7*, the differences in exercise participation levels among patients with different ages, genders, education levels, work status, number of strokes, main caregivers, and

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Table 7 Single factor analysis result of sports participation level

Items	Group	Case number	Exercise amount (Mets-h/week), M (P25, P75)	H/Z value	P value
Age	<50	10	16.6 (11.8, 23.8)	114.4	0.003**
	51–59	16	7.7 (4.3, 33.3)	96.5	
	60–69	33	6.5 (3.2, 17.2)	79.4	
	70–79	50	12.0 (4.5, 19.9)	91.7	
	≥80	54	4.3 (1.1, 13.1)	64.3 ^{ac}	
Gender	Male	93	10.3 (3.2, 21.0)	88.9	0.032*
	Female	70	6.2 (1.7, 14.4)	72.9	
Educational level	Never went to school	23	4.3 (1.1, 11.3)	55.8	<0.001**
	Primary school	27	3.7 (1.6, 7.2)	60.6	
	Middle school	40	10.0 (3.2, 20.5)	86.9	
	High school, technical secondary school or junior college	48	13.9 (5.9, 27.7)	100.3 ^{ab}	
	Bachelor or above	25	10.3 (2.0, 23.3)	86.4	
Working status	All-time	10	16.4 (7.3, 23.5)	108.0	0.047*
	Part-time	3	5.3 (4.7, –) [#]	78.0	
	Retired	134	8.1 (2.3, 19.5)	83.3	
	Unemployed	16	4.3 (1.2, 7.8)	56.1 ^a	
Primary caregiver	Spouse	39	8.1 (3.2, 18.8)	86.0	0.009**
	Child	32	3.5 (0.9, 12.2)	59.4	
	Nanny or caregiver	14	5.4 (2.2, 14.1)	70.1	
	Patient himself	78	11.9 (4.3, 21.1)	91.4 ^b	
Knowledge score	Poor	95	4.8 (1.6, 12.6)	67.7	<0.001**
	Good	36	14.6 (5.2, 22.9)	99.2 ^a	
	Excellent	32	18.2 (6.9, 31.7)	105.1 ^a	
Attitude score	Poor	87	3.7 (1.1, 7.0)	55.2	<0.001**
	Good	46	12.9 (7.7, 21.1)	99.6 ^a	
	Excellent	30	29.3 (15.0, 43.2)	132.8 ^{ab}	
Social support score	Poor	84	4.5 (1.6, 10.7)	64.6	<0.001**
	Good	54	13.1 (4.6, 22.0)	94.9 ^a	
	Excellent	25	19.9 (9.9, 43.4)	112.7 ^a	

*P<0.05, **P<0.01; [#]Since there were only three patients in this group, the data of P75 after analysis is indicated by “–”; ^adifferent from the first category of the item; ^bdifferent from the second category of the item; ^cdifferent from the fourth category of the item.

Table 8 Multiple linear regression analysis of sports participation level

Independent variable	β	β'	P	95% confidence interval	
				Lower limit	Upper limit
Constant	-12.455		0.260	-34.221	9.310
Age	-0.198	-0.148	0.036	-0.383	-0.013
Self-care level	3.967	0.197	0.003	1.330	6.603
Knowledge score	1.592	0.571	<0.001	1.173	2.011
Social support score	0.464	0.147	0.046	0.008	0.919

257 different post-stroke exercise knowledge, attitudes, and
 258 social support levels were all statistically significant.

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Multi-factor analysis of sports participation level

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Discussion

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Status quo of exercise participation of patients after radical gastric cancer surgery

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In the survey, we found that the overall exercise level of patients after radical gastric cancer surgery was at the level of almost non-exercise, which is consistent with the poor exercise participation level of patients after radical gastric cancer surgery that has been reflected in other studies (9). A lack of exercise will slow the patient's recovery progress and

increase the risk of disease recurrence (10), which deserves our attention.

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In addition, the type of exercise type that postoperative patients engaged in was relatively simple, mostly exercises that are low in difficulty, mild in intensity, and do not require excessive motor skills (such as climbing stairs and walking). On one hand, this suggests that these patients may lack motor skills. Furthermore, sports that are not similar to daily activities, such as yoga, Tai Chi, and ball sports, usually require specific learning to master sports skills, and some patients may lack these learning opportunities, resulting in lower participation. Studies have shown that exercises that require coordination of all parts of the body are better than exercises that require only a part of the limbs. To achieve the recommended amount of exercise, patients can engage in either short-term high-intensity exercise or long-term low-intensity exercise (11). Therefore, we recommend that patients participate in yoga, Tai Chi, and other activities that require the participation of all parts of the body and are not high intensity.

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Factors affecting the level of exercise participation of patients after radical gastric cancer surgery

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Univariate analysis showed that differences in age, gender, education level, work status, main caregivers, and exercise knowledge, attitudes, and social support levels after gastric cancer surgery all led to different levels of exercise participation. Given that there are many influencing factors in a single factor analysis, multiple linear regression analysis was performed to explore the factors that ultimately affect the patient's exercise participation level. It was found that age, degree of self-care in life, level of exercise attitude, and level of social support were the main factors affecting the level of exercise participation of patients after radical gastric

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327 cancer surgery.

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329 Age

330 This survey found that age negatively affects the level of
 331 patient participation in sports. Younger patients need to
 332 bear the support of their families and the entire society,
 333 and their urgency and demand for rehabilitation are also
 334 higher (12). This is a strong motivation for young patients
 335 to engage in sports, and leads to a relatively high level
 336 of sports participation. In addition to the disease factors
 337 after radical gastric cancer surgery, aging itself will result
 338 in a series of physical functional degradations and various
 339 comorbidities, leading to reduced energy, limited limb
 340 function, and fear of exercise risks in patients, which will
 341 hinder their participation in exercise. Studies have shown
 342 that exercise can also improve limb function in elderly
 343 patients after radical gastric cancer surgery (10). Therefore,
 344 patients of all ages should be encouraged to actively
 345 participate in sports, and at the same time, exercise guidance
 346 and supervision should be strengthened to reduce exercise
 347 risks and improve patients' enthusiasm for exercise.

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349 Self-care level

350 Multiple linear regression analysis also showed that the
 351 degree of self-care in life is an important factor affecting
 352 patients' participation in exercise after radical gastric cancer
 353 surgery, which is consistent with the results of research
 354 carried out at home and abroad. Patients with poorer self-
 355 care level typically have more severe impairment of limb
 356 function and greater difficulty during exercise. Some patients
 357 with severely impaired self-care ability can only stay in bed or
 358 are sedentary for extended periods of time (9), which directly
 359 affects their level of participation in sports. The loss of self-
 360 confidence and various dysfunctions caused by the substantial
 361 damage to the basic condition of the body will also cause
 362 patients to be unwilling to participate in sports, and may even
 363 lead to the idea of self-destruction (7). In addition, the poor
 364 self-care of patients will increase the burden on caregivers,
 365 making them prone to fatigue and depression, etc., which
 366 is not conducive to their ability to provide support and
 367 supervision of patients' participation in sports.

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369 Exercise attitude after radical gastric cancer surgery

370 Patients with better exercise attitude have higher levels of
 371 exercise participation. Sullivan *et al.* (13) pointed out that
 372 a patient's healthy attitude is crucial to changing unhealthy
 373 behaviors. Patients with a good attitude towards exercise,

even without the supervision of others, will lead to a higher
 level of exercise participation. Some scholars believe that
 if patients have a better attitude towards exercise, they
 will exhibit better exercise compliance, which will lead to
 greater exercise participation (3). It is generally believed
 that patients with a better attitude towards exercise will
 demonstrate a superior ability to overcome difficulties,
 which is conducive to the patient's persistence in exercise.
 Some patients with good exercise attitudes also set higher
 rehabilitation goals for themselves. Moreover, Deci
et al.'s self-determination theory posits that the goals set by
 individuals for results are conducive to maintaining healthy
 behaviors (14).

Exercise and social support after gastric cancer surgery

Social support refers to the supportive resources that
 individuals obtain from others or social networks, which can
 help them cope with problems in life (15). The improvement
 of sports participation requires not only the cooperation
 of patients, but also the help and encouragement of family
 members and the support of related sports facilities (16). In
 this survey, we found that the overall level of social support
 of the patients was poor, which will indirectly reduce the
 patient's level of participation in sports. The presence of a
 dedicated person to guide the knowledge and skills of sports
 after radical gastric cancer surgery will effectively improve
 the patient's level of sports participation (10).

Limitation

The number of patient samples in this study is too small,
 and a large sample study should be added for verification.

Conclusions

The current status quo of participation in exercise among
 patients after radical gastric cancer surgery is not ideal;
 their levels of exercise are low, and their exercise methods
 are relatively simple. The level of participation in exercise
 is primarily affected by the patient's age, degree of self-care
 in life, attitude towards exercise after surgery, and level of
 social support. Therefore, strengthening early rehabilitation
 training for patients after radical gastric cancer surgery,
 improving patients' self-care ability, vigorously promoting
 the importance of exercise after radical gastric cancer
 surgery, and mobilizing families and society to actively
 participate in and help patients undergoing radical gastric

421 cancer surgery to engage in a reasonable amount of exercise
422 will improve the level of patient participation in exercise.

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428

429 Footnote

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442

443 *Ethical Statement:* The authors are accountable for all
444 aspects of the work in ensuring that questions related
445 to the accuracy or integrity of any part of the work are
446 appropriately investigated and resolved. All procedures
447 performed in this study involving human participants were
448 in accordance with the Declaration of Helsinki (as revised
449 in 2013). The study was approved by institutional ethics
450 committee of the Affiliated Hospital of Jiangnan University
451 (No. LS2019043: the registration number of ethics board)
452 and informed consent was taken from all the patients.

453

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