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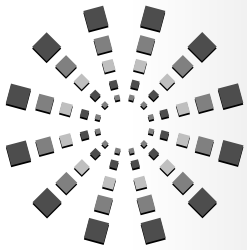

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Effect of Solution-Focused Therapy on Cancer-Related Fatigue in Patients With Colorectal Cancer Undergoing Chemotherapy

A Randomized Controlled Trial

KEYWORDS
Chemotherapy
Colorectal cancer
Fatigue
Quality of life
Solution-focused therapy

Background: Cancer-related fatigue (CRF) has gained increased attention in the past decade but remains difficult to treat. It is a predictor of patients' overall health and quality of life (QoL). Therefore, controlling fatigue is important for patients with cancer. **Objective:** The aim of this study was to test the effect of solution-focused therapy (SFT) in reducing CRF and improving QoL in patients with colorectal cancer (CRC) undergoing chemotherapy. **Methods:** A total of 124 patients with CRC undergoing chemotherapy were recruited and randomized to the SFT group or control group. Cancer-related fatigue was measured with the Cancer Fatigue Scale–Chinese version (CFS-C) at baseline, 3 months, and 6 months. Quality of life was measured with the Quality of Life Instruments for Colorectal Cancer Patients at baseline and 6 months. **Results:** Of 124 patients, 119 (95.9%) were evaluable. The SFT group showed significantly lower Cancer Fatigue Scale–Chinese version scores than the control group in all subscales and the total scores at 3 months ($P < .001$). At 6 months, the SFT group had significantly lower scores in cognitive fatigue ($P < .001$) and total fatigue ($P = .005$). The CRF of the SFT group decreased in the first 3 months ($P = .012$) but increased at 6 months ($P < .001$). The SFT group had significantly higher scores in the physical and psychological domains and

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overall QoL ($P = .002$, $P < .001$, and $P = .02$) than the control group at 6 months. **Conclusion:** Solution-focused therapy may decrease the CRF and improve QoL during chemotherapy for patients with CRC. **Implication for Practice:** Solution-focused therapy can be implemented to relieve fatigue and improve QoL in patients with CRC.

Fatigue is a common symptom in patients with colorectal cancer. As many as 80% of patients with colorectal cancer report fatigue,[1–3] especially during chemotherapy, with an incidence of up to 90%.[4,5] The National Comprehensive Cancer Network defined cancer-related fatigue (CRF) as a "distressing persistent, subjective sense of physical, affective and/or cognitive tiredness or exhaustion related to cancer or cancer treatment that is not proportional to recent activity and interferes with usual functioning."[6] Cancer-related fatigue is a multidimensional symptom that includes 3 dimensions: physical fatigue, affective fatigue, and cognitive fatigue.[6–8]

Fatigue has an impact on many aspects of patients' lives, including a reduction in energy level, sense of being out of control, alteration of daily routines, aggravation of other symptoms, significant distress, and social isolation.[9–11] Cancer-related fatigue even reduces patients' ability to complete medical treatments for cancer and participate in essential and valued life activities, thus undermining quality of life and potentially reducing overall survival.[12–15] Cancer-related fatigue affects patients longer and more severely and is a better predictor of patients' overall health and quality of life than most other symptoms.[1]

The definition of CRF is completely dependent on the subjective sense of tiredness felt by the patient.[16] There are various factors related to CRF, including the cancer itself, different cancer treatments, and other symptoms, such as anemia and cachexia[17,18]; in addition, sleep disturbances, pain, physical activity, and psychological factors, such as depression and negative expectations,[19–21] seem to be related to the experience of CRF.[9] Cancer-related fatigue is thus a painful experience caused by many negative events. It is extremely complex and likely to involve the interaction of many physiological and psychological mechanisms,[15,22] which means that the management of CRF presents significant challenges for health professionals.[18]

At present, there is no standard therapy for treating CRF.[23] Pharmaceutical interventions have yielded very small improvements in CRF.[9,14] There is, however, increasing evidence that exercise[24,25] and psychological[26] interventions are effective in reducing CRF and that they are significantly superior to existing drug options. Moreover, psychological intervention is considered the most promising intervention for CRF.[14,27–29]

Solution-focused therapy (SFT) is an active form of psychotherapy that focuses on the patient's experience rather than the problem.[30] This therapy emphasizes the exploration of the individual's potential and available resources to stimulate the individual's positive psychological experience. The theoretical core of SFT is the "pursuit of a better life."[31] Solution-focused therapy emphasizes optimistic goals to stimulate patients, such as being healthy, being efficient, and having the power to make their lives better.[32]

Solution-focused therapy consists of 5 stages: describing the problem, developing well-formed goals, exploring exceptions, providing feedback, and evaluating progress.[31] Through exploration of the successful experiences of the individual,[32] a positive psychological experience is promoted,[33,34] and adaptive and coping abilities are improved.[35] This type of therapy encourages individuals to participate in worthwhile life activities[36] and respects and trusts individuals' potential more than traditional problem-solving therapy does.[31] These factors are important to improve quality of life.[37,38]

Solution-focused therapy has been used in some nursing areas. Studies have shown that SFT conforms to the philosophical basis of contemporary psychological nursing and that nurses can acquire these skills by attending brief training courses.[39,40] Solution-focused therapy has been used in the treatment of patients with breast cancer,[35] lung cancer,[33] esophageal cancer,[34] and other chronic diseases.[41] Study results have shown that SFT can reduce depression,[33–35] improve self-efficacy, and improve quality of life.[35] In particular, 1 study with patients with inflammatory bowel disease (IBD) showed that SFT significantly reduced their fatigue.[41] There are many similarities between patients with IBD and patients with colorectal cancer. Inflammatory bowel diseases are chronic relapsing disorders characterized by debilitating symptoms such as abdominal pain, diarrhea, bleeding, weight loss, and chronic fatigue.[42] Inflammatory bowel disease and colorectal cancer are both intestinal diseases. Patients often have the same symptoms, such as anemia and nutritional disorders. Studies have shown that as many as 86% of people with IBD have reported fatigue,[43] and more than 40% of patients have reported fatigue lasting a long time.[41] Thus, the incidence of fatigue in patients with IBD was similar to that of patients with colorectal cancer, contributing to an assumption that SFT would have a similar effect on reducing fatigue in patients with colorectal cancer. However, there have been no randomized controlled trials (RCTs) to demonstrate the effect of SFT on CRF in patients with colorectal cancer.

A RCT was designed to demonstrate the effect of SFT on CRF in patients with colorectal cancer during chemotherapy. The hypothesis was that SFT would be more effective in reducing CRF at 3 and 6 months and in improving quality of life at 6 months than the usual health education for patients with colorectal cancer undergoing chemotherapy. The usual health education refers to the general health education conducted in accordance with nursing procedures and patients' nursing assessment results.

■ Theoretical Framework

According to the symptom management model,[44] a symptom, including fatigue, is a subjective experience reflecting changes in an individual's biopsychosocial functioning, sensations, or cognition. The symptom management model, used as this study's theoretical framework, emphasizes that the improvement

of symptoms should focus on an individual's perception of a symptom, evaluation of the meaning of the symptom, and response to the symptom.[44] Solution-focused therapy focuses on the patient's experience and actively explores the patient's experience of successful symptom management.[30] Patients' successful experiences often include their perceptions of symptoms, ways to alleviate symptoms, and attitudes toward symptom management. Through feedback on and affirmation of these successful experiences, patients' personal resources and potential can be maximized, which can improve their coping ability. It is assumed that SFT would reduce patients' fatigue and improve their quality of life. Therefore, we intended to test the effect of SFT on reducing CRF and improving the quality of life in patients with colorectal cancer undergoing chemotherapy.

Methods

Ethical Considerations

This study was supported by the Zhejiang Health Department (ref. no. 2014KYA114) and registered in the Chinese Clinical Trial Registry (registration number: ChiCTR1900022191) before data collection. All participants were thoroughly briefed on the research process before their consent to participate in this study was obtained, and all of them were ensured that there would be no consequences should they choose to withdraw their participation at any point during the study.

Design

This study was a single-blinded, two-group (SFT intervention and control) RCT with evaluations of the effect of SFT on patients with colorectal cancer during chemotherapy. The CONSORT statement was adopted for the study design and reporting.[45] The Cancer Fatigue Scale–Chinese version (CFS-C) was administered at baseline (test 0), at 3 months (test 1), and at 6 months (test 2). The Quality of Life Instruments for Colorectal Cancer Patients (QLICP-CR) was administered at baseline and 6 months.

Sample and Settings

The study was conducted at a teaching hospital in China. Patients with colorectal cancer needed to return to the hospital every month for 1 to 3 days of chemotherapy, for a total of at least 6 courses. Inclusion criteria for participants were as follows: (i) more than 18 years old with colorectal cancer, (ii) had accepted chemotherapy, (iii) had agreed to participate in this study and had signed informed consent, and (iv) had the ability to understand and write Chinese and could communicate effectively with researchers. The exclusion criteria were patients who (i) had received chemotherapy for another cancer or for their current cancer in the past, (ii) had received radiation along with chemotherapy, or (iii) had an estimated life expectancy of 6 months or less.

Sample Size and Randomization

G power was used to calculate the sample size based on study by Vogelaar,[41] which reported that SFT might reduce fatigue in patients with IBD. His study showed that 7 sessions of SFT had an effect size of 0.61 at 3 months and 0.46 at 6 months (the average effect size was 0.55). With 80% power and a .05 (2-sided) level of significance, a total of 54 participants were needed for each group. Based on the assumption of an attrition rate of 15%, a total of 124 patients were recruited. Eligible participants were allocated to the SFT group or control group using a randomization list created from a computer-generated series of random numbers. The randomization list was stored in a password-protected computer accessible only by a research assistant who was not involved in the intervention or data collection. The participants were blinded to group assignment.

Intervention

SOLUTION-FOCUSED THERAPY GROUP

Patients allocated to this group received SFT for 30 minutes on the first day of every chemotherapy course once a month for a total of 6 months. The SFT aimed to improve patients' use of their own resources to minimize fatigue. Solution-focused therapy consists of 5 stages: describing the problem, developing well-formed goals, exploring exceptions, providing feedback, and evaluating progress. The intervention was performed by 2 research nurses with backgrounds in psychology who had completed SFT training with a psychologist specialized in SFT. On the first day that the patients returned to the hospital for chemotherapy, the research nurse administered a one-on-one intervention with the patient in a private interview room.

The intervention process followed the 5 steps of SFT. First, the patient reported on the fatigue experienced in the past 7 days and actions taken to reduce that fatigue. Afterward, the research nurse discussed the expected goals with the patient and, if achieved, how his or her daily life would improve (physical, emotional, and social activities). Next, the research nurse guided the patient to recall a successful experience of dealing with fatigue in the past month. Afterward, the research nurse provided feedback on the patient's efforts to reduce fatigue over the past month and helped him or her define specific and feasible plans for the next month. Finally, the patient's fatigue was assessed before the next intervention.

Protocols were developed to guide the specific questioning and strategies. The protocols included both a guide to the overall structure and process of the intervention, and specific steps and problems. The specific steps of the intervention are presented in Figure 1.

CONTROL GROUP

Patients in the control group received the usual health education about CRF for 30 minutes on the first day of every chemotherapy course once a month for a total of 6 months. The education was performed by 2 oncology nurses and included content on diet and nutrition, the principles of activity and leisure, adequate sleep, medications prescribed by the doctor, etc. On the first day that a patient returned to the hospital for chemotherapy, the oncology nurse administered one-on-one education with the patient in a private interview room.

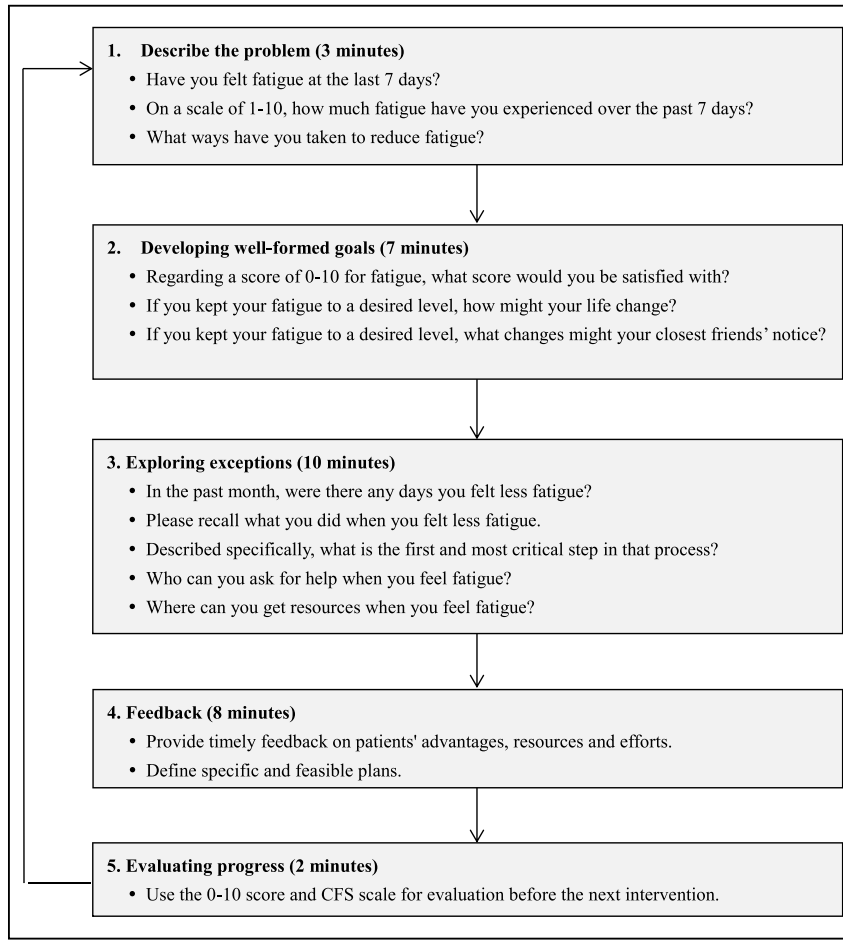

Figure 1 ■ Solution-focused therapy intervention steps.

Outcomes

PRIMARY OUTCOME

The primary outcome was CRF, which was measured with the CFS-C. The CFS was developed by Okuyama[46] and is frequently used to measure CRF. The CFS includes 3 subscales: physical fatigue, affective fatigue, and cognitive fatigue. There are 15 items in this scale. All items are scored on a 5-point Likert scale from 1 ("not at all") to 5 ("extremely"). Higher scores indicate a higher degree of fatigue. The test-retest reliability is 0.88. Three factors were obtained by Scree test, which accounted for 59.04% cumulative variance contribution rate, indicating that the scale has good structural validity. In 2011, the CFS was translated into Chinese by Zhang et al.[47] Cronbach's α of the Chinese version of the questionnaire is .86. We obtained permission to use the CFS-C from Zhang.

SECONDARY OUTCOME

The secondary outcome was quality of life, which was measured with the QLICP-CR. The QLICP-CR was developed by Chinese scholars.[48] It comprises the following 5 subscales with a total of 46 items: the physical domain (PHD; 7 items), psychological domain (PSD; 12 items), social domain (SOD; 6 items), common symptoms and side effects domain (SSD; 7 items), and specific domain (SPD; 14 items). The items are rated on a 5-point scale by which respondents describe their physical conditions over the past 7 days (1 = never, 5 = always). The total score ranges from 46 to 230, with higher scores indicating better quality of life. Cronbach's α of the scale has been reported to be greater than .70 and .79.

Data Collection and Analysis

Data were collected by research assistants who were blinded to the group assignments. All questionnaires were completed face-to-face and were collected immediately after completion.

Last observation carried forward (LOCF) was used as the imputation method to account for dropout and missing data. For patients who dropped out of the study between 3 and 6 months, changes in any of the outcome variables were obtained by carrying the last observation forward. To determine whether the results obtained were robust to the method of LOCF, we repeated the analyses and performed the hypothesis tests using data from completers.

Demographic and disease/treatment factors were extracted from the patients' medical records and a study-specific patient information questionnaire that included age, sex, education level, income, employment status, marital status, type of chemotherapy

(FOLFOX6 or XELOX), stage of disease at diagnosis, and presence of colostomy.

All analyses were performed using IBM SPSS 21.0 (SPSS Inc., Chicago, IL), with the statistical significance set at $P < .05$. Descriptive statistics are presented as means ± SD for numerical variables and number (percentage) for categorical variables. An independent sample t test was performed to compare the differences in the continuous variables between the two groups when normality and homogeneity assumptions were satisfied; otherwise, the Mann-Whitney U test was used. Chi-square or Fisher exact test was used to compare the categorical variables. A general linear model was used to compare the changes in the variables. Two-way repeated-measures analyses of variance (ANOVAs) were conducted on the primary outcome, CFS, and included treatment group (SFT or control) as the between-subjects factor and time as the within-subject factor. Data on violations of the statistical assumptions (independence, normality, and sphericity) underlying the repeated-measures ANOVA were examined.

■ Results

Study Enrollment and Baseline Characteristics

Patients were recruited from February 2015 to August 2017. Figure 2 illustrates the participant flowchart of the study. A total of 178 patients were screened for eligibility. A total of 124 patients were enrolled in the study and were randomly assigned to one of the 2 groups. At 3 months, 60 patients were followed up in the experimental group (2 cases of dropout: 1 patient withdrew because of moving to another city, and 1 was lost to follow-up), and 59 patients were followed up in the control group (3 cases of dropout: 2 patients withdrew because of transfer to another hospital, and 1 was lost to follow-up). At 6 months, 54 patients were followed up in the experimental group (6 cases of dropout: 3 patients withdrew because of stopping chemotherapy, 2 withdrew because of transfer to another hospital, and 1 was lost to follow-up), and 50 patients were followed up in the control group (9 cases of dropout: 4 patients withdrew because of stopping chemotherapy, 2 withdrew because of transfer to another hospital, 1 withdrew because of moving to another city, and 2 were lost to follow-up). Overall, 104 patients completed all 6 sessions of the SFT (54 patients) or usual health education (50 patients). No statistically significant differences in retention rates were observed at the 2 time points between the groups.

Patients who completed the 3-month intervention and test 1 were enrolled in the final analysis. Last observation carried forward was used to account for dropout and missing data. The demographic data for all the patients in the study are presented in Table 1. A total of 60 patients (34 male and 26 female) were in the SFT group, and 59 patients (36 male and 23 female) were in the control group. The mean age of all the patients was 60.73 years (SD, 10.75). Most of the patients had a middle school education (80.4%, n = 90), were not working (58.0%, n = 69), and had a monthly household income less than ¥10 000 (58.8%, n = 70). Table 2 shows the medical

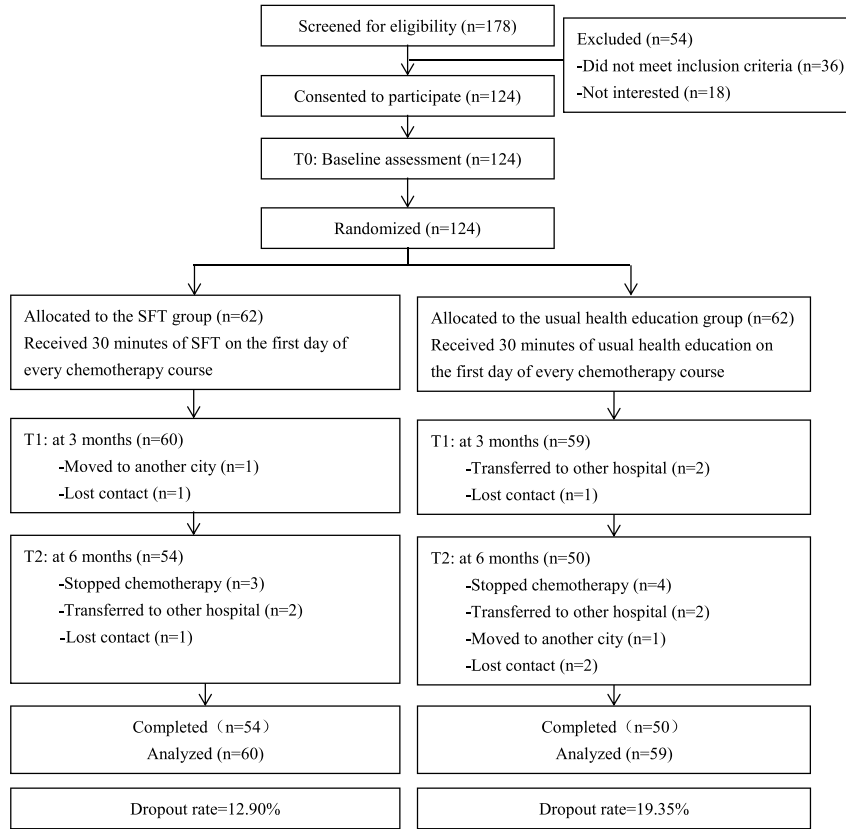

Figure 2 ■ Flow of participants through the study.

Table 1 • Demographic Profile of the Sample

Demographic	Total (N = 119) n (%)	SFT (n = 60) n (%)	Control (n = 59) n (%)	*P*
Age				
Mean (SD)	60.73 (10.75)	59.12 (11.36)	62.63 (9.46)	.07[a]
Range	41-76	41-76	43-76	
Gender				
Male	70 (58.5)	34 (56.7)	36 (61.0)	.63[b]
Female	49 (41.2)	26 (43.3)	23 (39.0)	
Highest education level				
Primary school	12 (10.7)	4 (6.7)	8 (13.6)	.32[b]
Middle school	90 (80.4)	50 (83.3)	40 (79.6)	
University	10 (8.9)	6 (10.0)	4 (6.8)	
Marital status				
Married	97 (81.5)	48 (80.0)	49 (83.1)	.67[b]
Divorced/separated/widowed	22 (18.5)	12 (20.0)	10 (16.9)	
Employment status				
Working	59 (42.0)	30 (50.0)	20 (33.9)	.08[b]
Not working	69 (58.0)	30 (50.0)	39 (66.1)	
Monthly household income (CNY)				
<10000	70 (58.8)	33 (55.0)	37 (62.7)	.67[b]
10000 ~ 30000	37 (31.1)	20 (33.3)	17 (28.8)	
>30000	12 (10.1)	7 (11.7)	5 (8.5)	

Abbreviations: CNY, Chinese Yuan; SFT, solution-focused therapy.
[a]One-way ANOVA test.
[b]Pearson χ^2 test.

characteristics of the sample at baseline. Most of the participants had stage III colorectal cancer (58.8%, n = 70), did not have a colostomy (62.2%, n = 74), and had received FOLFOX chemotherapy (56.3%, n = 67). No statistically significant differences were observed between groups at baseline. There were no significant differences in CFS or QLICP-CR scores at baseline between the groups (Table 3).

Primary Outcome

The CFS-C score changes across time indicated that all fatigue subscale scores were significantly lower for the SFT group than for the control group ($P < .001$) at 3 months (test 1). At 6 months (test 2), the SFT group still had significantly lower cognitive fatigue and total scores than did the control group (cognitive: $P < .001$, total score: $P = .002$). However, there was no difference in the physical and affective fatigue scores between the two groups (physical: $P = .06$, affective: $P = .324$) (Table 4). Sensitivity analyses carried out using only the completers yielded similar results (results not shown).

Two-way repeated-measures ANOVAs were conducted on the CFS scores to distinguish the effects of different interventions on CFS scores over time. In the Shapiro-Wilk tests of the normality

Table 2 • Medical Characteristics of the Sample at Baseline

Characteristic	Total (N = 119) n (%)	SFT Group (n = 60) n (%)	Control Group (n = 59) n (%)	*P*
Overall stage of disease				
Stage II	25 (21)	13 (21.6)	12 (20.3)	.88[a]
Stage III	70 (58.8)	34 (56.7)	36 (61.0)	
Stage IV	24 (20.2)	13 (21.7)	11 (18.6)	
Colostomy				
Yes	45 (37.8)	21 (35.0)	24 (40.7)	.52[a]
No	74 (62.2)	39 (65.0)	35 (59.3)	
Type of chemotherapy				
FOLFOX	67 (56.3)	35 (56.3)	32 (54.2)	.65[a]
XELOX	52 (43.7)	25 (41.7)	27 (45.8)	

Abbreviation: SFT, solution-focused therapy.
[a]Pearson χ^2 test.

Table 3 • Baseline Questionnaire Scores (T0)

Variables	SFT (n = 60) Mean ± SD	Control (n = 59) Mean ± SD	*P*
CFS-C			
Physical	18.55 ± 4.97	18.64 ± 4.8	.872
Affective	11.50 ± 3.08	11.36 ± 2.88	.793
Cognitive	11.17 ± 2.68	11.00 ± 3.32	.764
Total scale	41.22 ± 9.99	41.05 ± 10.39	.929
QLICP-CR			
PHD	20.20 ± 4.15	18.64 ± 4.54	.053
PSD	33.45 ± 6.97	31.15 ± 6.73	.066
SOD	15.72 ± 5.66	16.56 ± 5.54	.414
SSD	20.97 ± 4.28	19.59 ± 4.76	.101
SPD	35.88 ± 8.60	33.24 ± 9.28	.109
Total	126.22 ± 20.87	119.19 ± 24.60	.095

Abbreviations: CFS-C, Cancer Fatigue Scale–Chinese version; PHD, physical domain; PSD, psychological domain; QLICP-CR, Quality of Life Instruments for Colorectal Cancer Patients; SFT, solution-focused therapy; SOD, social domain; SPD, specific domain; SSD, common symptoms and side effects domain; T0, test before the intervention.

of student residuals, the data of each group were normally distributed ($P > .05$). The covariance matrix of the dependent variable CFS score conformed to Mauchly's spherical hypothesis ($P > .05$). The results showed that the interaction between treatment and time had a statistically significant effect on the CFS score ($F_{2,116} = 3.69$, $P = .028$) (Table 5). Sensitivity analyses carried out using only the completers yielded similar results (results not shown).

Therefore, the individual effects of treatment and time were further analyzed. The effect of the treatment (SFT or control) on the CFS score was statistically significant ($F_{1,58} = 10.33$, $P = .002$). At baseline, the difference between the two groups was not statistically significant. At 3 and 6 months, the CFS score of the SFT group was significantly lower than that of the control group (at 3 months: $P < .001$; 95% confidence interval [CI], −7.54 to −2.91; at 6 months: $P = .005$; 95% CI, −7.35 to −1.36). The effect of time indicated that the CFS score of the SFT group decreased in the first 3 months ($P = .012$; 95% CI, −6.49 to −0.843) but increased at 6 months ($P < .001$; 95% CI, 2.44-7.23); in contrast, the CFS score of the control group continued to increase ($P = .002$; 95% CI, 1.51-6.60). Overall, the CFS score of the control group was significantly higher than that of the SFT group (Figure 3).

Secondary Outcome

The QLICP-CR scores showed that the SFT group had significantly higher scores in the PHD ($P = .002$), PSD ($P < .001$), and overall quality of life ($P = .020$) than did the control group at 6 months. However, there were no significant differences in the SOD ($P = .185$), SSD ($P = .132$) and SPD ($P = .179$) between the two groups (Table 6). Sensitivity analyses carried out using only the completers yielded similar results (results not shown).

Discussion

The purpose of this study was to assess the effectiveness of SFT on the CRF and quality of life of patients with colorectal cancer undergoing chemotherapy. According to study results, at 3 months, all fatigue subscale scores and the total fatigue scores were lower (better) in the SFT group than in the control group ($P < .001$). At 6 months, the cognitive fatigue and total fatigue scores of the SFT group were still lower than those of the control group (cognitive: $P < .001$, total: $P = .002$). These findings indicated that SFT reduced fatigue significantly, especially during the first 3 months (Figure 3). Furthermore, the effects of SFT on physical and emotional fatigue decreased after 3 months, but the effect on cognitive fatigue persisted for 6 months.

Cancer-related fatigue is a painful experience caused by negative events.[18,20] Solution-focused therapy is an active psychological intervention that focuses on how to stimulate a patient's potential.[49] Patients' potential and available resources are explored through the recall of successful experiences in coping with fatigue. Nurses help patients set specific plans based on their expected goals and their potential.[33,34] In this way, patients' coping ability can be improved, which helps reduce their fatigue and improve their quality of life. In a study by Vogelaar et al,[41] SFT effectively reduced the fatigue levels of patients with inflammatory disease, which was consistent with our results.

The present study also showed that SFT had a good effect initially but that the effect decreased after 3 months. Comparing

Table 4 • Estimated Differences in CFS-C Scores Between the Two Groups (N = 119)

Variables		SFT (n = 60)	Control (n = 59)	SFT-C	
CFS-C	Time	Mean ± SD	Mean ± SD	Estimated Mean Difference (95% CI)	*P*
Physical	T1	18.10 ± 2.78	20.20 ± 2.88	−2.10 (−3.13 to −1.08)	<.001
	T2[a]	21.07 ± 3.53	22.37 ± 4.00	−1.31 (−2.67 to 0.07)	.06
Affective	T1	9.70 ± 2.04	11.12 ± 2.06	−1.42 (−2.16 to −0.68)	<.001
	T2[a]	11.83 ± 2.27	12.46 ± 2.55	−0.44 (−1.31 to 0.44)	.324
Cognitive	T1	9.75 ± 2.02	11.42 ± 2.18	−1.67 (−2.44 to −0.91)	<.001
	T2[a]	9.48 ± 2.45	12.15 ± 2.43	−2.67 (−3.55 to −1.78)	<.001
Total	T1	37.55 ± 6.28	42.75 ± 6.09	−5.20 (−7.44 to −2.94)	<.001
	T2[a]	42.38 ± 6.68	46.80 ± 8.34	−4.41 (−7.16 to −1.67)	.002

Abbreviations: C, control; CFS-C, Cancer Fatigue Scale–Chinese version; CI, confidence interval; LOCF, last observation carried forward; SFT, solution-focused therapy; T1, at 3 months; T2, at 6 months.
[a]Using LOCF.

Table 5 • Estimated Differences in Interventions on CFS-C Scores Over Time[a] (N = 119)

	Mean	SE	*F*	*P*	η^2	95% CI
Treatment × time	—	—	3.69	0.028	0.060	—
Treatment (SFT-C)	—	—	10.33	0.002	0.151	—
Baseline	0.02	1.91	0.00	0.993	—	−3.81 to 3.84
T1	−5.22	1.16	20.38	<0.001	—	−7.54 to −2.91
T2	−4.36	1.50	8.48	0.005	—	−7.35 to −1.36
Time	—	—	13.80	0.000	0.192	—
SFT group	—	—	7.25	0.001	—	—
T1-baseline	−3.67	1.41	—	0.012	—	−6.49 to −0.843
T2-T1	4.833	1.19	—	<0.001	—	2.44 to 7.23
Control group	—	—	8.17	0.001	—	—
T1-baseline	1.70	1.60	—	0.292	—	−1.50 to 4.89
T2-T1	4.05	1.27	—	0.002	—	1.51 to 6.60

Abbreviations: C, control; CFS-C, Cancer Fatigue Scale–Chinese version; CI, confidence interval; LOCF, last observation carried forward; SFT, solution-focused therapy; T1, at 3 months; T2, at 6 months.
[a]Using LOCF.

the changes in each dimension, we find that the physical and affective fatigue scores for the SFT group were increased after 3 months, but the cognitive fatigue scores decreased further. Increased physical fatigue may be associated with anemia, leukopenia, sleep disturbance, and other symptoms during chemotherapy.[50–52] Affective fatigue is mainly related to interest in things, concentration, and active work.[6] Initially, through the exploration of patients' potential and available resources, SFT promotes patients' positive emotional responses. However, during chemotherapy, many patients rest at home and do not return to work and housework, and social activities are significantly reduced. As chemotherapy continues, their daily routines change, their sense of being out of control increases, and their ability to participate in valued life activities diminishes.[9–11] These changes lead to depression and negative emotions, which exacerbate affective fatigue. In addition, the exacerbation of physical fatigue aggravates emotional fatigue. The diminishment of treatment effects has also been observed in previous studies that evaluated the effects of psychotherapy on reducing fatigue or improving quality of life.[27–29,53,54]

On the other hand, SFT had positive effects on cognitive fatigue. After the intervention, cognitive fatigue was significantly decreased, and the effect persisted for 6 months. Cognitive fatigue mainly includes carelessness, verbal errors, forgetfulness, and slow thinking. In previous studies of SFT, researchers have noted that the use of more precise vocabulary and specific questioning techniques, such as scales, is an important means to promote patient change.[55,56] The use of these techniques can help patients understand the problem more clearly and promote positive coping, which may be the reason for the effects on cognitive fatigue lasting longer than the effects on other types of fatigue.

Our results showed that at 6 months, the SFT group had significantly higher scores in the PHD ($P = .002$), PSD ($P < .001$), and overall quality of life ($P = .020$) than the control group.

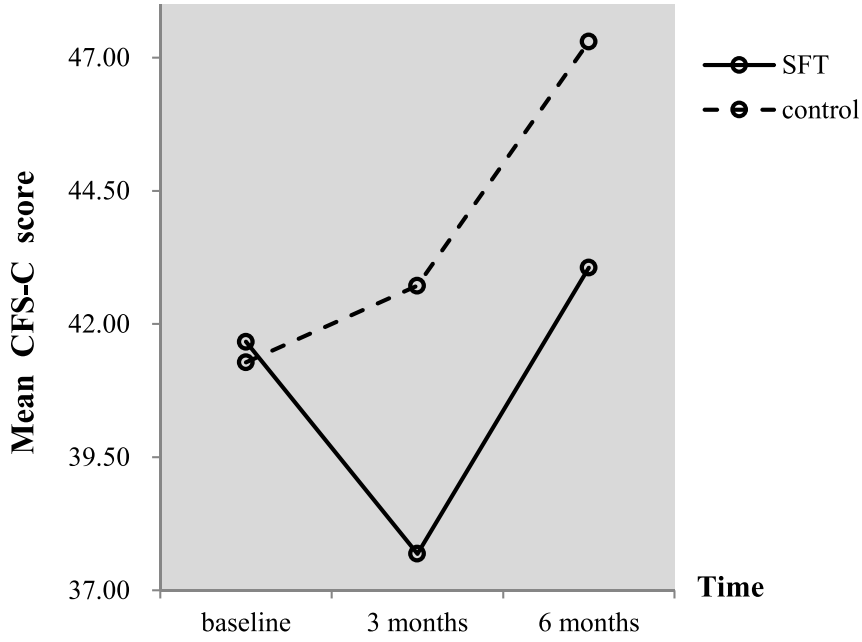

Figure 3 ■ General linear model of CFS-C. Abbreviations: CFS-C, Cancer Fatigue Scale–Chinese version; SFT, solution-focused therapy.

Table 6 • Estimated Differences in of Quality of Life Between Groups at 6 Months[a] (N = 119)

Variables	SFT (n = 60)	Control (n = 59)	SFT-C	
QLICP-CR	Mean ± SD	Mean ± SD	Estimated Mean Difference (95% CI)	*P*
PHD	18.42 ± 2.48	17.05 ± 2.29	1.37 (0.50 to 2.23)	.002
PSD	29.88 ± 4.12	27.19 ± 3.49	2.70 (1.31 to 4.08)	<.001
SOD	17.58 ± 4.33	18.61 ± 4.06	−1.03 (−2.55 to 0.50)	.185
SSD	17.88 ± 2.88	17.00 ± 3.45	0.88 (−0.27 to 2.04)	.132
SPD	30.02 ± 5.68	30.53 ± 6.35	1.49 (−0.70 to 3.68)	.179
Total	115.78 ± 11.73	110.37 ± 13.33	5.41 (0.85 to 9.97)	.020

Abbreviations: C, control; CI, confidence interval; LOCF, last observation carried forward; PHD, physical domain; PSD, psychological domain; QLICP-CR, Quality of Life Instruments for Colorectal Cancer Patients; SFT, solution-focused therapy; SOD, social domain; SPD, specific domain; SSD, common symptoms and side effects domain.
[a]Using LOCF.

However, there were no significant differences in the SOD (P = .185), SSD (P = .132), and SPD (P = .179) between the two groups. Several factors might explain our results. First, the theoretical core of SFT is the "pursuit of a better life."[57] Patients are encouraged to participate in valued life activities,[36] which is an important factor related to quality of life. Through the exploration and affirmation of the efforts and successful experiences of patients,[49] patients' positive psychological experience is promoted,[33,34] and negative reactions are reduced; furthermore, adaptive ability and coping ability are improved.[35] Therefore, SFT can improve the physical and psychological dimensions of quality of life. Second, the physiological and psychological dimensions of quality of life are highly correlated with fatigue, and thus, they clearly increase with the improvement of fatigue. However, social functioning, symptoms, and side effects, as well as specific aspects, are influenced by many other factors, such as support systems,[14] financial conditions,[58] and the cancer itself,[59] which are mostly objective factors and difficult to improve through psychological interventions. Third, many other symptoms during chemotherapy, such as pain, sleep disorders, gastrointestinal reactions, and bone marrow suppression, may result in increased fatigue and decreased quality of life.[60,61] In general, SFT can improve quality of life, but the improvement is limited due to many factors related to quality of life. Solution-focused therapy is effective in reducing fatigue in patients with colorectal cancer and can improve their quality of life to some extent. Therefore, we recommend that SFT be used to reduce fatigue in patients with colorectal cancer during chemotherapy. Solution-focused therapy can be performed by oncology nurses who have completed SFT training. However, the effect of SFT decreased because the fatigue increased as chemotherapy continued, especially in the physical and affective fatigue dimensions. To improve the intervention, we are trying to increase the frequency of SFT.

■ Limitations

There were some limitations to this study. This study involved only 6 months of follow-up. Earlier studies have shown that psychotherapy improves stress, fatigue, and quality of life during an intervention but that this improvement often ends after the intervention, with a decline in quality of life after a longer follow-up period of 18 months.[14,26] To test the stability and effectiveness of the intervention program, longitudinal studies with long-term follow-ups are recommended.

Another limitation was the unequal sample size of the conditions, given the high dropout rate in the control group (19.35%). However, we did not recruit additional samples because it would take at least 6 months to complete all the interventions and would be difficult to be consistent with previous research. Finally, we included variables for patients who completed the 3-month intervention and the first test in the analysis. For patients who dropped out of the study between 3 and 6 months, changes in any of the outcome variables were obtained by carrying the last observation forward. We repeated the analyses and performed the hypothesis tests using data from completers, which yielded similar results. Finally, this study was a single-site study. Future studies should be conducted at multiple study sites to ensure generalizability to patients with colorectal cancer.

■ Conclusion

Fatigue is a common symptom during chemotherapy for colorectal cancer and has a significant impact on the quality of life of the individual. Earlier studies have shown that positive psychological interventions can reduce levels of fatigue. This article presented a 6-month RCT that substantiated the positive effects of SFT on CRF and quality of life, particularly in the first 3 months of chemotherapy. Therefore, SFT is an effective psychological intervention and can be used to relieve fatigue and improve quality of life in patients with colorectal cancer during chemotherapy. Oncology clinics or oncology units may consider implementing this therapy.

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