


# Comparison of Quality of Life Between Breast Cancer Patients Treated With and Without Adjunctive Traditional Chinese Medicine in Taiwan

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## Abstract

In Taiwan, breast cancer has the highest incidence among all cancers. Although adjunctive traditional Chinese medicine treatment (TCM) have been used to ameliorate the side effects or discomfort caused by cancer treatments, no study has focused on the assessment of the quality of life of patients undergoing adjunctive TCM treatments. This study compared the quality of life between breast cancer patients treated with and without adjunctive TCM. Questionnaires were collected from 7 hospitals with a Chinese medicine clinic in 2018 to 2019. Breast cancer patients who had cancer stages I, II, or III and also underwent resection surgery were included in the study. They were divided into 2 groups: patients receiving cancer treatments with adjunctive traditional Chinese medicine (TCM group) and those receiving cancer treatments without adjunctive traditional Chinese medicine (non-TCM group). A 1:1 matching was used to obtain the study participants. The EQ-5D questionnaire was used to assess the quality of life. Statistical analysis was performed using the *t*-test and ANOVA to compare the differences between variables. The conditional multiple regression model was applied to explore the factors associated with quality of life in breast cancer patients. A total of 543 participants were surveyed, and 450 participants were included in the study. The EQ-5D score of the TCM group ( $81.60 \pm 11.67$ ) was significantly higher than that of the non-TCM group ( $78.80 \pm 13.10$ ;  $P < .05$ ). The results of a conditional multiple regression model showed that the TCM group had a higher (3.45 points) quality of life than non-TCM group ( $P = .002$ ) after adjusting for other related factors. After stratifying by cancer stage, patients with cancer stages II and III scored 5.58 and 4.35 points higher in the TCM group than did those in the non-TCM group ( $P < .05$ ). Breast cancer patients undergoing cancer treatment with adjunctive traditional Chinese medicine have a higher quality of life than those treated without adjunctive traditional Chinese medicine.

## Keywords

breast cancer, quality of life, Chinese medicine treatment, adjunctive traditional Chinese medicine, EQ-5D

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## Introduction

The World Health Organization estimated that the number of global cancer cases rose from 14 million in 2012 to 24 million in 2035.<sup>1</sup> Early detection of cancer and proper treatment can increase its cure rate.<sup>2</sup> In Taiwan, from 2014 to 2018, the 5-year relative survival rates of cancer for men and women were 52.6% and 68.0%, respectively.<sup>3</sup>

Most cancers are treated with conventional treatment, and Chinese medicine is mostly used to improve the effect of cancer treatment.<sup>4</sup> Chinese herbal medicine can boost the immune system of patients with cancer and reduce pain and discomfort after treatment. Most cancer patients experience

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symptoms such as vomiting, dizziness, fatigue, and pain during the treatment process. To reduce discomfort and improve the treatment effect, several cancer patients choose complementary and alternative medicine (CAM).<sup>5</sup> Many studies have shown that adding CAM can alleviate the discomfort associated with cancer treatment and reduce mortality.<sup>6-9</sup>

Previous studies indicated 12.8% of newly diagnosed cancer patients had a record of taking CAM from 2001 to 2009.<sup>10</sup> Many studies have also shown that traditional Chinese medicine (TCM) treatment is the primary choice for CAM,<sup>11-13</sup> especially for cancer treatment.<sup>14,15</sup>

Breast cancer is the second most common cancer worldwide and the most common cancer among women.<sup>16</sup> The crude incidence rate of breast cancer in Taiwan was 117.83 per 100 000 female population, ranking first in female cancers.<sup>17</sup> Asian breast cancer patients often use Chinese herbal medicines for their treatment.<sup>18</sup> A study showed that 81.5% of breast cancer patients in Taiwan's National Health Insurance Database used adjunctive TCM treatment between 1998 and 2008.<sup>19</sup> Studies have shown that cancer patients who use TCM have significantly lower mortality during or after treatment than do cancer patients who do not use TCM.<sup>8,9</sup> Although Chinese medicine has shown its clinical benefit in cancer treatment, research comparing whether breast cancer patients receiving adjunctive traditional Chinese treatment can improve the quality of life and its related factors is lacking. Therefore, this study aimed to compare the quality of life between breast cancer patients treated with and without adjunctive TCM.

## Materials and Methods

### Research Design

This study adopted a cross-sectional design. Patients with breast cancer were recruited as the research group. The study period was from August 2018 to July 2019. Questionnaires were administered across Taiwan in cooperation with hospitals in various districts. After receiving the institutional review board (IRB) approval, a total of 7 hospitals (4 medical centers and 3 regional hospitals) conducted a questionnaire survey on breast cancer patients. This study was approved by the Clinical Trial/Human Research Committee Review of the Research Ethics Committee of cooperation hospitals and China Medical University and affiliated hospitals (number CMUH106-REC3-057).

### Research Participants

The subjects were female breast cancer patients, and the inclusion criteria were as follows: (1) 20 years of age or older, (2) with breast cancer stages I to III, and (3) had breast cancer surgery. The exclusion criteria were the following: (1) unknown stage, (2) had more than 2 types of

cancer, (3) had cancer for less than half a year, (4) had cancer for more than 7 years, and (5) patients who could not respond to the questions by themselves. The research subjects were divided into 2 groups: the "TCM group" comprising of breast cancer patients who have received cancer treatment and adjunctive TCM for more than 30 days each year after breast cancer diagnosis and the "non-TCM group" comprising of breast cancer patients who never had TCM breast cancer treatment before the questionnaire interview and only received cancer treatments (including surgery, radiation therapy, chemotherapy, hormonal therapy, or immunotherapy). The adjunctive TCM used for more than 30 days each year was essentially herbal medicine.

### Sampling

The study used the National Health Agency to determine the latest number of female breast cancer cases. Seven hospitals, which had both standard and Chinese medicine departments, were randomly sampled. After the hospital and IRB approved the implementation plan, the doctor captured the patient information from their medical records and confirmed the eligibility of patients with breast cancer. When the patient consented, the interviewer (nurse) assisted the patient in filling out the questionnaire in the outpatient department. The standard deviation of quality of life in breast cancer was 12.47 in this study. With a significance level of  $\alpha = .05$ , power  $(1 - \beta) = .8$ , and  $E = 5$ , the minimum number of samples required for each group of breast cancer patients was 66.

### Instruments

The EQ-5D questionnaire was used to collect data, and the Quality of Life Questionnaire (QLQ) developed by the European Organization of Research and Treatment for Cancer (EORTC) was adopted to complete the study. The content was divided into respondents and medical staff members. The respondents' answers included 7 items: (1) EQ-5D scale, (2) EORTC quality of life scale (physical functioning, role functioning, emotional functioning, cognitive functioning, and social functioning), (3) patient's personal characteristics (age of illness, education level, and body mass index), (4) socioeconomic status (family income and occupational category), (5) social support (marital status, religion, and whether living with family), (6) health behavior (exercise habits), and (7) The characteristics of cancer patients (cancer stage, year of cancer diagnosis, whether there is cancer recurrence or metastasis) were filled in by the medical staff. The questionnaire presents as an additional file (Supplemental File 1).

The EQ-5D was developed by the EuroQol group. It is a preference-based health-related quality of life (HRQOL) measurement tool that covers mental and physiological

aspects. It has 5 aspects, including mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. The scores of each aspect can be converted into a single EQ-5D score that represents the overall HRQOL and has often been used in clinical and public health evaluation studies in recent years.<sup>20-22</sup> This study used the EQ-5D visual analog scale (EQ-5D VAS) in the EQ-5D questionnaire to observe the quality of life of breast cancer patients. The EQ-5D VAS score ranged from 0 to 100 points. The higher the EQ-5D VAS score, the better the health status and the quality of life. The validity of EQ-5D has been described in the Taiwanese population.<sup>23-25</sup>

### Reliability and Validity

The study invited 6 relevant experts and scholars to measure the content validity, evaluate the applicability of the questions and options of the questionnaire, and modify the questionnaire content according to the experts' suggestions. Vaguely defined topics were clarified to confirm the integrity of the questionnaire in this study. After expert review, the opinions were combined, and the index of content validity (CVI) scoring method was used to calculate the questionnaire responses. When CVI >0.8 means that the questionnaire has good validity. The CVI value of the questionnaire ranged from 0.94 to 1.00, with an average of 0.997, indicating that the questionnaire was highly valid in this study.

### Statistical Analysis

To calculate the difference between the TCM group and non-TCM group, propensity score matching (PSM) was used, including cancer stage, years of cancer, marital status, living condition, religious belief, employment status, and whether there is recurrence or metastasis in a 1:1 ratio through the greedy matching technique. PSM can reduce the difference and avoid bias between the 2 groups.<sup>26</sup>

In descriptive statistics, the number, percentages, and averages of personal characteristics, social support, healthy behavior, cancer characteristics, and scores of various aspects of quality of life were analyzed between the 2 groups. ANOVA and Duncan post hoc tests were used to compare different personal characteristics, socioeconomic status, social support, health behavior, cancer characteristics, and quality of life when receiving cancer treatment, and then the paired t-test was further used to analyze the difference in the quality of life between the 2 groups under different characteristics. Conditional multiple regression was used, with the EQ-5D score as the dependent variable, the TCM group and non-TCM group as independent variables, and personal characteristics, socioeconomic status, social support, health behavior, cancer characteristics, and quality of life scale as control variables, to explore

differences in the quality of life. Other related factors that affect the quality of life of breast cancer patients are also discussed. Considering the different qualities of life in different cancer stages, we further compared the difference in quality of life between the 2 groups in Stages I, II, and III. All statistical analyses were performed using the SAS software (version 9.4; SAS Institute Inc., Cary, NC, USA).

### Results

A total of 543 valid questionnaires were collected, including the TCM group (n=228, 41.99%) and non-TCM group (n=315, 58.01%). After 1:1 PSM, a total of 450 breast cancer patients were included as the research subjects, with 225 patients for each patient group.

After the matching, Table 1 shows no significant difference in the stage of cancer and years of cancer between the 2 groups ( $P=1.00$ ). The basic characteristics "married," "living with family or friends," "religious," and "working with a job" were higher in both treatment groups. However, these characteristics did not reach a statistically significant difference between the 2 groups ( $P>.05$ ). Among the 450 breast cancer patients, stage II breast cancer was the most common (n=190, 42.22%), followed by stage I (n=170, 37.78%) and stage III (n=90, 20%). Regarding the number of years of cancer, those with cancer for 1 to 2 years were the most common (n=120, 26.67%), followed by those with cancer for 5 to 7 years (n=104, 23.11%).

As shown in Table 2, the EQ-5D VAS quality of life score of breast cancer patients in the TCM group was  $81.60 \pm 11.67$  points, which was significantly higher than the  $78.80 \pm 13.10$  points in the non-TCM group ( $P<.05$ ). A difference in the basic characteristics of quality of life was observed between 2 groups. After the ANOVA test, statistically significant differences were not observed in the patients' quality of life in terms of age, BMI, education, marital status, living conditions, monthly salary, religion, employment status, exercise habits, stage of cancer, years of cancer, and recurrence or metastasis ( $P>.05$ ).

Table 2 presents the quality of life difference between TCM group and non-TCM group for basic characteristics. In those aged 55 to 64 years, the quality of life score of the TCM group ( $83.47 \pm 12.88$ ) was significantly higher than that in the non-TCM group ( $75.96 \pm 14.16$ ;  $P<.05$ ). In the breast cancer patients who were married ( $81.82 \pm 11.63$  vs  $78.34 \pm 13.19$ ), lived with family members ( $81.71 \pm 11.89$  vs  $78.83 \pm 13.06$ ), were religious ( $82.13 \pm 11.92$  vs  $79.11 \pm 13.20$ ), had work ( $81.71 \pm 11.50$  vs  $78.66 \pm 12.13$ ), and had no recurrence or metastasis ( $81.95 \pm 11.44$  vs  $78.60 \pm 13.45$ ), their quality of life was significantly higher in the TCM group than that in the non-TCM group ( $P<.05$ ). Regarding the different stages and years of cancer (as shown in Table 2), in those with 5 to 7 years of cancer, the quality of life ( $84.77 \pm 11.40$ ) of patients in the TCM group

**Table 1.** Characteristics of Breast Cancer Patients in the TCM Group and Non-TCM Group After 1:1 Matching.

Variables	Before matching							After 1:1 Matching						
	Total		Non-TCM group		TCM group		P*	Total		Non-TCM group		TCM group		P*
	N	%	N	%	N	%		N	%	N	%	N	%	
Female	543	100.00	315	58.01	228	41.99		450	100.00	225	50.00	225	50.00	
Cancer stage							0.479							1.000
Stage I	208	38.31	123	39.05	85	37.28		170	37.78	85	37.78	85	37.78	
Stage II	234	43.09	137	43.49	97	42.54		190	42.22	95	42.22	95	42.22	
Stage III	101	18.60	55	17.16	46	20.18		90	20.00	45	20.00	45	20.00	
Years of cancer							0.426							1.000
0.5-1	50	9.21	24	7.62	26	11.40		48	10.67	24	10.67	24	10.67	
1-2	131	24.13	71	22.54	60	26.32		120	26.67	60	26.67	60	26.67	
2-3	87	16.02	56	17.78	31	13.60		62	13.78	31	13.78	31	13.78	
3-4	76	14.00	45	14.29	31	13.60		62	13.78	31	13.78	31	13.78	
4-5	65	11.97	37	11.75	28	12.28		54	12.00	27	12.00	27	12.00	
5-7	134	24.68	82	26.03	52	22.81		104	23.11	52	23.11	52	23.11	
Marital status							0.351							.293
Single	60	11.05	33	10.48	27	11.84		44	9.78	17	7.56	27	12.00	
Married	409	75.32	232	73.65	177	77.63		349	77.56	175	77.78	174	77.33	
Widowed	43	7.92	29	9.21	14	6.14		34	7.56	20	8.89	14	6.22	
Divorce/ separated	31	5.71	21	6.67	10	4.39		23	5.11	13	5.78	10	4.44	
Living condition							0.676							1.000
Living alone	30	5.52	19	6.03	11	4.82		23	5.11	12	5.33	11	4.89	
Living with family or friends	513	94.48	296	93.97	217	95.18		427	94.89	213	94.67	214	95.11	
Religion							0.623							.548
No	179	32.97	107	33.97	72	31.58		149	33.11	78	34.67	71	31.56	
Yes	364	67.03	208	66.03	156	68.42		301	66.89	147	65.33	154	68.44	
Working conditions							0.970							.479
No	166	30.57	97	30.79	69	30.26		144	32.00	76	33.78	68	30.22	
Yes	377	69.43	218	69.21	159	69.74		306	68.00	149	66.22	157	69.78	
Cancer recurrence or metastasis							0.936							.718
No	509	93.74	296	93.97	213	93.42		417	92.67	207	92.00	210	93.33	
Yes	34	6.26	19	6.03	15	6.58		33	7.33	18	8.00	15	6.67	

\*Chi-square.

was significantly higher than that in the non-TCM group ( $77.31 \pm 12.77$ ). In different cancer stages, stage II breast cancer patients in the TCM group ( $83.04 \pm 11.47$ ) had significantly higher quality of life than that in the non-TCM group ( $78.76 \pm 13.95$ ), whereas a significant difference was not observed in patients with stage I and III breast cancer ( $P > .05$ ). In the functional aspects of the EORTC QLQ-C30 questionnaire, the role ( $90.89 \pm 14.51$  vs  $93.85 \pm 13.38$ ) and social functions ( $86.15 \pm 18.95$  vs  $89.41 \pm 16.06$ ) of patients in the non-TCM group were significantly higher than those in the TCM group ( $P < .05$ ).

Table 3 shows the difference of the 5 questions in the EQ-5D questionnaire between the TCM group and

non-TCM group. In the aspects of mobility (88% vs 92%), self-care (96% vs 97.78%), daily activities (87.56% vs 92.89%), and pain/discomfort (50.22% vs 52%), the TCM group has a higher proportion in the minimum difficulty level than that in the non-TCM group. In the aspects of anxiety/frustration (64% vs 58.22%), a lower proportion of minimum difficulty level was observed in the TCM group than the non-TCM group. No significant difference was found in the 5-dimension results between the 2 groups ( $P > .05$ ).

In Table 4, the conditional multiple regression model was used to analyze the related factors that affect the quality of life of patients with breast cancer. After controlling for

**Table 2.** Comparison of the Quality of Life (EQ-5D VAS) Between TCM Group and Non-TCM Group.

Variables	Non-TCM group				TCM group				
	n	MEAN	SD	P*	n	Mean	SD	P*	P&
Total	225	78.80	13.10		225	81.60	11.67		.017
Age (years)				.096				.085	
<45	28	77.86	11.82		37	79.81	11.36		.502
45-54	69	81.12	10.97		98	82.50	10.35		.408
55-64	73	75.96	14.16		57	83.47	12.88		.002
≥65	55	80.16	14.25		33	77.70	12.86		.417
BMI				.400				.497	
<18	5	71.00	18.51		12	77.75	11.55		.371
18-24	102	79.14	12.94		130	81.71	11.48		.111
>24	118	78.85	13.02		83	81.99	12.02		.084
Education				.058				.341	
None	6	66.67	24.22		4	69.75	20.17		.839
Elementary	50	80.38	14.32		18	81.67	14.14		.744
Junior high school	49	76.73	13.25		27	84.26	11.53		.016
Senior high/vocational school	65	77.92	11.69		81	81.72	12.00		.057
College/university	51	82.00	11.26		78	81.12	10.69		.654
Graduated	4	76.25	6.29		17	81.76	9.18		.273
Marital status				.567				.897	
Single	17	78.94	14.31		27	81.11	10.77		.570
Married	175	78.34	13.19		174	81.82	11.63		.009
Widowed	20	82.75	12.08		14	81.71	15.13		.826
Divorce/separated	13	78.85	12.10		10	79.00	10.75		.975
Living condition				.898				.551	
Living alone	12	78.33	14.35		11	79.55	6.11		.793
Living with family or friends	213	78.83	13.06		214	81.71	11.89		.018
Monthly salary (NT dollars)				.529				.157	
≤30000	119	77.65	14.84		81	81.70	11.94		.034
30001-60000	66	79.64	11.48		81	81.19	11.04		.407
60001-90000	20	81.25	9.44		40	79.50	12.13		.575
≥90001	20	80.50	9.72		23	86.35	11.52		.082
Religion				.633				.317	
No	78	78.23	12.97		71	80.45	11.10		.266
Yes	147	79.11	13.20		154	82.13	11.92		.038
Working conditions				.823				.835	
No	76	79.08	14.89		68	81.35	12.13		.320
Yes	149	78.66	12.13		157	81.71	11.50		.025
Exercise habit				.240				.070	
Never	42	77.02	13.62		8	80.63	15.68		.506
Occasionally	70	76.66	14.74		68	78.62	12.32		.399
1-2 days/week	24	81.25	11.06		35	81.89	10.74		.826
3-5 days/week	32	79.84	11.60		48	81.79	10.50		.438
Most days	57	81.14	11.88		66	84.50	11.33		.111
Cancer stage				.764				.251	
Stage I	85	78.22	13.43		85	80.16	11.69		.316
Stage II	95	78.76	13.95		95	83.04	11.47		.022
Stage III	45	80.00	10.55		45	81.27	11.96		.596
Years of cancer				.761				.211	
0.5-1	24	78.54	16.97		24	79.29	12.47		.862
1-2	60	78.83	12.26		60	81.40	10.72		.225
2-3	31	81.94	13.76		31	80.87	11.99		.747

(continued)

**Table 2. (continued)**

Variables	Non-TCM group				TCM group				P <sup>§</sup>
	n	MEAN	SD	P*	n	Mean	SD	P*	
3-4	31	79.16	11.57		31	78.55	11.85		.837
4-5	27	77.85	13.11		27	82.33	12.45		.204
5-7	52	77.31	12.77		52	84.77	11.40		.002
Recurrence or metastasis				.437				.090	
No	207	78.60	13.45		210	81.95	11.44		.007
Yes	18	81.11	7.96		15	76.67	14.10		.290
EORTC Quality of Life Questionnaire-Core 30 (QLQ-C30) <sup>#</sup>									
Physical	225	90.81	10.34		225	89.01	12.50		.095
Role	225	93.85	13.38		225	90.89	14.51		.025
Emotional	225	82.48	19.34		225	78.89	20.18		.055
Cognitive	225	79.85	20.57		225	78.22	19.73		.392
Social	225	89.41	16.06		225	86.15	18.95		.049

\*ANOVA.

§Paired t-test.

<sup>#</sup>Average scores of the EORTC QLQ-C30, from 0 to 100. Higher scores represent higher/healthier function.**Table 3. EQ-5D-5L Scores Between the TCM Group and Non-TCM Group.**

EQ-5D	Non-TCM group		TCM group		P value <sup>a</sup>
	N	%	N	%	
Mobility					
No problem	198	88.00%	207	92.00%	.151
Slight problem	20	8.89%	16	7.11%	
Moderate	6	2.67%	1	0.44%	
Severe	1	0.44%	0	0.00%	
Unable	0	0.00%	1	0.44%	
Self-care					
No problem	216	96.00%	220	97.78%	.278
Slight problem	9	4.00%	5	2.22%	
Moderate	0	0.00%	0	0.00%	
Severe	0	0.00%	0	0.00%	
Unable	0	0.00%	0	0.00%	
Usual activities					
No problem	197	87.56%	209	92.89%	.082
Slight problem	26	11.56%	15	6.67%	
Moderate	1	0.44%	0	0.00%	
Severe	0	0.00%	1	0.44%	
Unable	1	0.44%	0	0.00%	
Pain/discomfort					
No problem	113	50.22%	117	52.00%	.522
Slight problem	99	44.00%	96	42.67%	
Moderate	9	4.00%	10	4.44%	
Severe	2	0.89%	2	0.89%	
Unable	2	0.89%	0	0.00%	
Anxiety/depression					
No problem	144	64.00%	131	58.22%	.146
Slight problem	71	31.56%	76	33.78%	
Moderate	5	2.22%	14	6.22%	
Severe	4	1.78%	1	0.44%	
Unable	1	0.44%	3	1.33%	

<sup>a</sup>Cochran-Mantel-Haenszel analysis.

**Table 4.** The Overall Scores of the Patients' Quality of Life and Its Related Factors Between TCM Group and Non-TCM Group (n=450).

Variables	Quality of life				Adjusted model <sup>&amp;</sup>		
	n	Mean	SD	P value	β	SE	P value
Group				.017			
(1) non-TCM group (ref)	225	78.80	13.10	(2) > (1)			
(2) TCM group	225	81.60	11.67		3.45	1.12	.002
Age				.164			
<45 (ref)	65	78.97	11.51				
45-54	167	81.93	10.60		2.92	1.38	.035
55-64	130	79.25	14.07		-2.40	1.65	.147
≥65	88	79.24	13.72		-2.29	1.93	.234
BMI				.307			
<18 (ref)	17	75.76	13.69				
18-24	232	80.58	12.19		4.15	2.89	.150
>24	201	80.14	12.68		5.75	2.88	.046
Education				.041			
(1) None (ref)	10	67.90	21.54	(1) < (2)			
(2) Elementary	68	80.72	14.18	(1) < (3)	12.15	5.34	.023
(3) Junior high school	76	79.41	13.10	(1) < (4)	10.03	5.47	.067
(4) Senior high/vocational school	146	80.03	11.97	(1) < (5)	9.99	5.42	.065
(5) College/university	129	81.47	10.88	(1) < (6)	11.53	5.50	.036
(6) Graduated	21	80.71	8.84		9.07	5.71	.112
Marital status				.738			
Single (ref)	44	80.27	12.14				
Married	349	80.07	12.54		-0.57	1.89	.765
Widowed	34	82.32	13.21		4.24	2.87	.139
Divorce/separated	23	78.91	11.28		-0.30	3.10	0.923
Living condition				.611			
Living alone (ref)	23	78.91	10.97				
Living with family or friends	427	80.27	12.55		-0.44	1.94	.819
Monthly salary (NT dollars)				.222			
≤30 000 (ref)	200	79.29	13.85				
30 001-60 000	147	80.49	11.23		1.24	1.27	.329
60 001-90 000	60	80.08	11.26		1.60	1.59	.315
≥90 001	43	83.63	11.00		3.24	1.76	.066
Religion				.275			
No (ref)	149	79.29	12.13				
Yes	301	80.65	12.63		1.39	1.05	.186
Working conditions				.954			
No (ref)	144	80.15	13.66				
Yes	306	80.23	11.89		-1.07	1.14	.347
Exercise habit				.004			
(1) Never (ref)	50	77.60	13.86	(5) > (1)			
(2) Occasionally	138	77.62	13.59	(5) > (2)	-1.66	1.86	.373
(3) 1-2 days/week	59	81.63	10.78		-0.41	2.11	.847
(4) 3-5 days/week	80	81.01	10.93		0.11	1.94	.953
(5) Most days	123	82.94	11.66		1.47	1.94	.449
Cancer stage				.405			
Stage I (ref)	170	79.19	12.59				
Stage II	190	80.90	12.92		1.16	1.13	.308
Stage III	90	80.63	11.23		1.10	1.23	.371
Years of cancer				.810			
0.5-1 (ref)	48	78.92	14.74				
1-2	120	80.12	11.54		0.21	1.82	.909

(continued)

Table 4. (continued)

Variables	Quality of life				Adjusted model <sup>&amp;</sup>		
	n	Mean	SD	P value	$\beta$	SE	P value
2-3	62	81.40	12.81		0.95	2.00	.637
3-4	62	78.85	11.62		-1.22	2.12	.564
4-5	54	80.09	12.86		-0.48	1.99	.810
5-7	104	81.04	12.62		1.53	1.90	.419
Recurrence or metastasis				.595			
No (ref)	417	80.29	12.57				
Yes	33	79.09	11.21		1.10	1.67	.511
EORTC QLQ-C30 <sup>#</sup>							
Physical	450	89.91 <sup>#</sup>	11.49		0.24	0.06	<.001
Role	450	92.37 <sup>#</sup>	14.02		-0.01	0.05	.795
Emotional	450	80.69 <sup>#</sup>	19.83		0.11	0.04	.004
Cognitive	450	79.04 <sup>#</sup>	20.15		0.08	0.04	.018
Social	450	87.78 <sup>#</sup>	17.62		0.08	0.04	.061

<sup>&</sup>Conditional multiple regression model.

<sup>#</sup>Average scores of the EORTC QLQ-C30, from 0 to 100. Higher scores represent higher/healthier function.

other related variables, the quality of life score in the TCM group was 3.45 points higher than the non-TCM group ( $P < .05$ ). Those who received Chinese medicine treatment, age, BMI, education level, and EORTC QLQ-C30 functional aspects affected the quality of life of breast cancer patients. For all breast cancer patients, in the EORTC QLQ-C30 functional aspect, the scores of physical, emotional, and cognitive functions had a positive relationship with the quality of life; however, a significant difference was not observed in the role and social functions.

After stratifying breast cancer patients by cancer stage, a conditional multiple regression analysis was performed. Table 5 shows that after controlling for other related variables, among breast cancer patients with cancer stages II and III, the quality of life of the TCM group was higher than the non-TCM group (5.58 points,  $P < .05$ , and 4.35 points,  $P < .05$ ). In stage I breast cancer patients, the quality of life was higher in the TCM group than the non-TCM group at 0.30 points, with no statistically significant difference ( $P > .05$ ; Table 5).

## Discussion

This study compared the quality of life of breast cancer patients treated with and without adjunctive TCM. In this study, 41.99% of patients with breast cancer received TCM therapy before pairing. Huebner et al's<sup>27</sup> study showed that 50% of breast cancer patients used adjuvant therapies in German in 2011. Molassiotis et al's<sup>28</sup> study estimated that 44.7% of breast cancer patients used CAM in Europe in 2006. Lai et al<sup>29</sup> used Taiwan's National Health Insurance Database to analyze the results and found that 81.5% of breast cancer patients used Chinese medicine during 1999 to

2008, and 17.8% chose Chinese medicine adjuvant treatment to alleviate the side effects of breast cancer treatment.

The overall EQ-5D VAS quality of life scores of 543 breast cancer patients were  $80.06 \pm 12.44$  points. In Germany, Wallwiener et al's<sup>30</sup> study, including 96 breast cancer patients who had metastasis and received adjuvant therapy, revealed an EQ-5D VAS score of 64.7, which was lower than that in our study, suggesting that subjects had different cancer conditions. More than 90% of the research subjects in this study were breast cancer patients without recurrence or metastasis. In South Korea, Rim et al's<sup>31</sup> study used the EQ-5D VAS questionnaire to assess changes in the quality of life of 1,156 breast cancer patients after radiotherapy for 3 years. The longer the cancer diagnosis, the higher the quality of life scores. Our results revealed that the quality of life scores of breast cancer patients in the first 3 years were 78.92, 80.12, and 81.4, which is similar to the previous study.

The result showed that the EQ-5D VAS quality of life score of breast cancer patients in the TCM group was  $81.60 \pm 11.67$  points, which was significantly higher than the  $78.80 \pm 13.10$  points in the non-TCM group ( $P < .05$ ). Moreover, after controlling for other related variables, the results showed that compared with the non-TCM group, the quality of life score of the TCM group was higher ( $\beta = 3.45$ ,  $P < .05$ ), suggesting that the positive effect of adjuvant therapy of TCM on the quality of life of breast cancer patients. Breast cancer patients often have several discomforts during the treatment process, such as physical changes, fatigue, and pain, eating, sleep, and other problems, including anxiety, depression, and anxiety associated with dying.<sup>32</sup> Chinese medicine treatment includes Chinese herbal medicine, acupuncture, massage, qigong, and diet. A study in



**Table 5.** Stratified Analysis: Comparison of the Quality of Life (EQ-5D VAS) of Breast Cancer Patients Between TCM Group and Non-TCM Group.

Variables	Non-TCM group (ref)			TCM group			Adjusted model <sup>&amp;</sup>		
	n	Mean	SD	n	mean	SD	β	SE	P value
Total	225	78.80	13.10	225	81.60	11.70	3.45	1.12	.002
Stage I	85	78.22	13.43	85	80.16	11.69	0.30	1.84	.871
Stage II	95	78.76	13.95	95	83.04	11.47	5.58	2.10	.008
Stage III	45	80.002	10.55	45	81.27	11.96	4.35	2.08	.037

<sup>&</sup>Conditional multiple regression model has been adjusted for variables including age, BMI, education, marital status, living condition, monthly salary, religion, working conditions, exercise habit, years of cancer, recurrence or metastasis, and scores on the EORTC QLQ-C3 5 functional scales (physical, role, cognitive, emotional, and social).

Australia pointed out that breast cancer patients used Chinese medicine and acupuncture as the main treatment.<sup>33</sup> The reason for the use of Chinese medicine supplementary therapy is that 69% of patients wish to reduce stress to meet their psychological needs and 54% to reduce fatigue caused by cancer treatment.<sup>33</sup> Our study showed that the quality of life of breast cancer patients treated with adjunctive TCM was significantly higher than those without adjunctive TCM (81.6 vs 78.8,  $P < .05$ ), showing that Chinese medicine adjuvant treatment has significantly improved the quality of life of patients. In recent years, studies have confirmed the benefits of adjuvant treatment in patients with cancer.<sup>8,9</sup> In 2010, the National Health Insurance Administration implemented a health policy for cancer patients, promoting the integration of Chinese medicine in cancer care.<sup>34</sup> With the combined Chinese and conventional treatment, cancer patients may experience fewer and less severe side effects of cancer treatment. In 2016, Tao et al's<sup>35</sup> meta-analysis concluded 67 studies, and the result showed that acupuncture in traditional Chinese medicine could relieve cancer-related symptoms of pain, fatigue, sleep disturbance, and gastrointestinal distress; massage could reduce gastrointestinal distress; Tai Chi could improve the lung capacity in breast cancer patients. In 2020, Bai et al's<sup>36</sup> meta-analysis showed that combined traditional Chinese medicine could effectively improve the quality of life and reduce the incidence of adverse symptoms such as gastrointestinal adverse reactions. The relief of discomfort allows cancer patients to complete the entire medical treatment process, providing a maximum effect, especially for weight loss, malaise, pain, and other problems.<sup>36</sup> The physical conditioning of Chinese medicine can further improve the quality of life of cancer patients.

Previous studies have used questionnaires to explore the results of Chinese medicine adjuvant treatment for cancer. Yang et al<sup>37</sup> showed that those who received Chinese medicine adjuvant therapy during hospitalization had less fatigue and improved overall health status. Liu et al<sup>6</sup> studied patients receiving chemotherapy for liver cancer to explore the influence of TCM adjuvant therapy. The results showed

that TCM adjuvant therapy can indeed improve the negative effects of cancer treatment. Another double-blind randomized trial observed immune function changes and analyzed the quality of life in patients with ovarian cancer after receiving TCM adjuvant therapy.<sup>7</sup> The results showed that TCM helps improve the immune function of patients with ovarian cancer, but no significant difference in the quality of life was observed.<sup>7</sup> A Taiwanese study compared the quality of life of 45 breast cancer patients who received cancer treatment with or without Chinese medicine<sup>38</sup> The results showed no significant difference in the quality of life between the 2 groups.<sup>38</sup> The survival rate was higher in cancer treatment with TCM than cancer treatment without TCM (25.5 months vs 22.7 months,  $P < .05$ ).<sup>38</sup> Previous studies have improved the results of using TCM adjuvant treatment. However, in their discussion, the small sample size was considered a research limitation. Our study has a larger sample size and has a significant finding in patients receiving TCM adjuvant treatment who have a better quality of life.

In this study, we used the EQ-5D VAS questionnaire to evaluate breast cancer patients' quality of life. The results of the study found that receiving TCM adjuvant treatment, age, BMI, education, physical function, emotional function, and cognitive function were significant factors related to the quality of life in breast cancer patients. Moreover, breast cancer patients with a BMI >24 also have a higher quality of life, similar to the results of Rahman et al's<sup>39</sup> study, mainly because breast cancer patients with a higher BMI have better health and nutrition. When undergoing treatment or surgery, the relative tolerance and recovery are also better, leading to a higher quality of life.<sup>39</sup>

This study had several strengths. First, a questionnaire survey was conducted at 7 hospitals across the country. According to the number of female breast cancer cases in each hospital, the number of cases accepted by each hospital was determined proportionally, which was representative of a certain degree. Second, 450 breast cancer patients were enrolled in this study after matching. The minimum number of samples required for each group of breast cancer

patients was 66, which reached the number of samples required for research analysis. This study used the EQ-5D questionnaire as the main assessment tool for quality of life, which can further transform the quality of life into research on utility in the future. There are some limitations in this study. First, the cross-sectional design cannot track changes in patients' quality of life before and after treatment. Second, the study didn't include the hormonal status and detail of conventional therapies. However, our study has matched the cancer stage, years of cancer, and recurrence or metastasis variables to lower the difference in disease severity.

## Conclusion

A higher quality of life was observed in breast cancer patients treated with adjunctive traditional Chinese medicine compared with those treated without adjunctive traditional Chinese medicine.

## Novelty and Impact Statement

This study adopted a cross-sectional design. Patients with breast cancer were recruited as the research group. The study period was from August 2018 to July 2019. Questionnaires were administered across Taiwan in cooperation with hospitals in various districts. The study finds the EQ-5D score of patients receiving cancer treatments with adjunctive traditional Chinese medicine ( $81.6 \pm 11.67$ ) was significantly higher than that of those receiving cancer treatments without adjunctive traditional Chinese medicine ( $78.80 \pm 13.10$ ;  $P < .05$ ). The effect of adjunctive traditional Chinese medicine can improve the quality of life in breast cancer patients

## Declaration of Conflicting Interests

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## Supplemental Material

Supplemental material for this article is available online.

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