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*Research Article*

# Factors Associated with Adherence to Complete Decongestion Therapy in Women with Breast Cancer-Related Lymphedema

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*Background.* Adherence to complete decongestion therapy (CDT) is of utmost importance for patients with breast cancer-related lymphedema (BCRL). However, past studies have demonstrated that adherence to CDT in BCRL patients is less than satisfactory. Our study aimed to describe the level of adherence to CDT among BCRL patients and utilize the Health Belief Model to analyse the key factors that influence adherence. *Methods.* We employed a convenient sampling method to select 158 patients with BCRL who were in the maintenance stage of CDT in a grade A tertiary tumour hospital in Guangzhou. A questionnaire survey was used to investigate patients' adherence to CDT, as well as their sociodemographic characteristics, medical history characteristics, disease knowledge, and health beliefs. *Results.* The CDT adherence score of BCRL patients was $96.46 \pm 18.46$ points, with an average score of $2.61 \pm 0.50$ points per item. The adherence rate was $65.18 \pm 12.47\%$, indicating a moderate level of adherence. Factors that significantly influenced CDT adherence in BCRL patients included age under 45 years, having 0 or 1 child, experiencing 9 lymphedema symptoms, and having low levels of disease knowledge and health beliefs ($p < 0.05$). *Conclusions.* The level of adherence to CDT in BCRL patients is moderate and requires improvement. To enhance adherence to CDT, medical professionals should focus on patients who are younger, have fewer children, exhibit fewer symptoms of lymphedema, possess limited disease knowledge, and have weak health beliefs.

## 1. Introduction

Breast cancer is the most prevalent malignant tumour in women. As the latest data show, breast cancer has become the cancer with the highest incidence around the world and the most common cancer among women worldwide [1]. Among Chinese female patients, the new attack rate of breast cancer also ranks first, with a world standard attack rate of 29.05/100000 [2]. Breast cancer-related lymphedema (BCRL) is a disease that occurs with limb swelling as the main feature and is mainly caused by damage to the lymphatic system due to breast cancer surgery, radiotherapy, or tumour metastasis [3, 4]. Its incidence accounts for 9.1%~ 39% of the complications after breast cancer surgery [5–8] and will gradually increase with time after breast cancer

surgery [9]. Furthermore, BCRL is a highly disabling disease that can not only cause swelling, numbness, pain, dysfunction, and other problems in patients' limbs [10] but also cause deformity and disability of affected limbs or induce sepsis, exacerbate patients' inferiority, fear, anxiety, and other negative emotions [11, 12], and seriously interfere with patients' quality and experience of life. Therefore, patients with BCRL need extensive attention.

The preferred treatment for BCRL is complete decongestive therapy (CDT), a conservative treatment of lymphedema consisting of manual lymphatic drainage, pressure treatment, functional exercise, and skin care. CDT is divided into two stages: the initial stage, which lasts from the beginning of treatment until the regression of lymphedema, and the maintenance stage, which begins after

regression and continues for the rest of the patient's life [13–17]. CDT has the longest application time, the widest application scope, and the most definite curative effect. It can effectively alleviate lymphedema symptoms and prevent their aggravation. However, CDT necessitates lifelong adherence, and the degree of adherence to CDT significantly impacts its effect in BCRL patients [18, 19]. Research shows that good adherence to CDT at the maintenance stage of treatment can effectively improve the swelling and pain of affected limbs [18], which means that a high level of adherence to CDT is particularly critical for patients with BCRL.

However, the adherence that BCRL patients have to CDT is not positive. Studies judged the adherence of patients according to the ratio range between their actual frequency of various treatment methods and the specified frequency. The result showed that 69% of patients had an average adherence rate of less than 75% [20]. Studies have also found that only 19.5% of patients can complete all the behaviours required in the guidelines [21]. It can be concluded that the CDT adherence of most patients with BCRL is low. In addition, the treatment adherence at the maintenance stage is worse than that at the initial stage [18]. During the maintenance stage, the treatment is conducted mainly by patients at home, lacking the help and supervision of lymphedema therapists. The maintenance stage treatment is complex and diverse, with a long-term or even lifelong duration, making it difficult for patients to maintain good treatment adherence. Notably, studies have shown that a low level of maintenance treatment adherence can lead to the failure of lymphedema treatment in 38%, 53%, and 65% of patients at 1, 2, and 4 years, respectively [19]. Treatment failure was defined as a lymphedema volume increase of ≥50% of the total reduction obtained during the initial stage. Therefore, the adherence to CDT of patients with BCRL, especially at the maintenance stage, should be widely valued.

Adherence to CDT in BCRL patients is affected by many factors. According to the Health Belief Model (HBM) [22–26], health beliefs, influencing and restricting factors (such as knowledge structure factors, demographic factors, disease and treatment factors), clues, or intentions of action can directly affect individual health behaviours, and influencing and restricting factors can also indirectly affect individual health behaviours by influencing health beliefs. Studies have indicated that patients with BCRL who possess a high level of knowledge are more likely to comply with treatment [27]. Furthermore, perceiving the benefits of treatment or harm of nontreatment has been found to effectively improve treatment adherence among patients with BCRL [28]. However, most of the existing studies are conducted in Western countries, and the evidence from Asian countries is limited. Moreover, since the relevant guidelines and specifications for the standard treatment of lymphedema, known as CDT, were released in China in 2020 [29], standardized CDT has not been fully popularized throughout the country. At present, the existing research in China is still focusing on the effectiveness of various treatment methods.

Therefore, the adherence behaviour to CDT of patients with BCRL needs more research and discussion. This study will thoroughly and comprehensively explore the influencing factors of adherence to CDT in patients with BCRL, with the aim of providing a theoretical basis for clinical researchers to carry out personalized intervention measures and improve CDT adherence in BCRL.

## 2. Materials and Methods

*2.1. Participants and Procedure.* Our study was approved by the Ethics Committee of the School of Nursing, Sun Yat-sen University (ethical batch number: L2022SYSU-HL-017).

We contacted BCRL patients who had received CDT at the initial stage in the lymphedema treatment room of a grade A tertiary tumour hospital in Guangzhou through WeChat or telephone.

The specific eligibility requirements of patients included the following: (1) BCRL diagnosed by a certified lymphedema therapist according to a standardized clinical evaluation; (2) receiving CDT for lymphedema and in the maintenance stage of treatment for at least 4 weeks; (3) age ≥18 years old; (4) primary school education or above, with communication, reading, and writing abilities; and (5) informed consent and voluntary participation in this study. The patients' exclusion criteria included (1) other malignant tumours or serious heart, liver, lung, kidney, and other important organ diseases and (2) serious mental illness.

Given that the primary independent variable in this study was quantitative data, a multiple linear regression method is proposed for statistical analysis. Based on a literature review, we identified approximately 23 factors that may influence adherence to CDT, including disease knowledge, health beliefs, and education level. Using the sample estimation method proposed by M. Kendall, which suggests that the sample size should be 5~10 times the number of variables, and considering 20% invalid questionnaires, a minimum of 138 cases are required for this study.

### 2.2. Measurements

*2.2.1. Sociodemographic and Medical History Variables.* The sociodemographic information collected included age, height, weight, education level, marital status, presence or absence of children, employment status, family residence, per capita monthly income, and type of medical expense payment. Participants also provided information about their medical history, including comorbid conditions, types of treatment for breast cancer, types of surgery for breast cancer, the onset time of lymphedema, the start time of lymphedema treatment, the affected area of lymphedema, self-perceived lymphedema severity, and self-perceived lymphedema symptoms (electronic supplementary material S1).

*2.2.2. Adherence to CDT.* This study investigated the CDT adherence of patients with BCRL by using a questionnaire

designed by the researcher (electronic supplementary material S1). This is because the existing measurement tools for the adherence to CDT of patients with BCRL cannot comprehensively, accurately, and directly measure the adherence to CDT of patients.

Based on the specific contents and precautions of CDT in the previous literature, CDT includes four aspects: manual lymphatic drainage, pressure treatment, functional exercise, and skin care. Self-protection and risk factor avoidance should also be carried out at the same time as CDT. Therefore, 37 items were established, which were divided into 5 dimensions, namely, adherence to manual lymphatic drainage (11 items), adherence to pressure treatment (6 items), adherence to functional exercise (8 items), adherence to skin care (6 items), and adherence to risk factor avoidance (6 items). A more detailed description of the questionnaire development can be found in the electronic supplementary material S2.

According to the comments of 5 experts, the content validity index of this questionnaire item level was 1.0, and the content validity index of the questionnaire level was 1.0. In this study, Cronbach's $\alpha$ coefficient of the entire questionnaire was 0.808, and Cronbach's $\alpha$ coefficients of each dimension were 0.825, 0.762, 0.822, 0.769, and 0.840, respectively, with good reliability.

The questionnaire was scored with the Likert 4-level scoring method. "Never" was scored 1 point, "occasionally" was scored 2 points, "frequently" was scored 3 points, and "always" was scored 4 points. The sum of the scores for each item was calculated as the total score of adherence to CDT (the total score ranged from 37 to 148 points). The higher the score is, the higher the adherence level for CDT of the patient is. At the same time, the average score of items <2 represents a "low level"; 2 ≤ the average score of items <3 represents a "medium level"; and 3 ≤ the average score of items ≤4 represents a "high level" [30–32].

*2.2.3. Disease Knowledge.* The disease knowledge level of patients with BCRL was investigated through the Breast Cancer-Related Lymphedema Disease Knowledge Questionnaire designed by the researcher (electronic supplementary material S1).

Based on the concept, function, and specific content of CDT for lymphedema in previous literature, as well as the clinical health education content related to the prevention and treatment of lymphedema, 32 items were developed, which were organized into 6 dimensions, including basic knowledge of CDT (5 items), knowledge related to manual lymphatic drainage (5 items), knowledge related to pressure treatment (6 items), knowledge related to functional exercise (6 items), knowledge related to skin care (5 items), and knowledge related to risk factor avoidance (5 items). A more detailed description of the questionnaire development can be found in the electronic supplementary material S2.

According to the comments of 5 experts, the content validity index of this questionnaire item level was 1.0, while the content validity index of the questionnaire level was 1.0. In this study, Cronbach's $\alpha$ coefficient of the questionnaire

was 0.868, and Cronbach's $\alpha$ coefficients of each dimension were 0.879, 0.813, 0.798, 0.732, 0.756, and 0.804, respectively, with good reliability.

A score of "1" was given for correct responses and "0" for incorrect or unclear responses. The overall score for disease knowledge is calculated as the sum of all item scores ranging from 0 to 32. The higher the score is, the higher the patient's mastery of the knowledge of lymphedema is, similar to prior lymphedema-related research. At the same time, 0 ≤ the total knowledge score ≤19 represents a "low level"; 20 ≤ the total knowledge score ≤25 represents a "medium level"; and 26 ≤ the total score of knowledge ≤32 represents a "high level." 0 ≤ the average score of items <0.6 represents a "low level"; 0.6 ≤ the average score of items <0.8 represents a "medium level"; and 0.8 ≤ the average score of items ≤1 represents a "high level" [33–35].

*2.2.4. Health Belief.* To evaluate the health belief level of BCRL patients, a revised version of the Health Belief Scale [36] was employed. This updated version was created by Chinese scholar Ji Shaoyan, who conducted cross-cultural adjustments to the literal version of the original Health Belief Scale [37] in 2013 (electronic supplementary material S1).

The scale comprises a total of 48 items, which are categorized into five dimensions: personal health belief, feeling capable of implementation, feeling controlled, feeling resourceful, and feeling threatened. The Likert 5-level scoring method is used to score 1 to 5 points from very weak to very strong. A higher score indicates a stronger level of health belief. The average score of items ≥3 points indicates that the patient's health belief level is medium or above. Cronbach's $\alpha$ coefficient of the total scale was 0.935, and Cronbach's $\alpha$ coefficients of each dimension were 0.866, 0.824, 0.791, 0.891, and 0.891, respectively, with good reliability and validity. The Chinese version of the scale was first used to investigate the health beliefs of hospitalized patients [36] and then used to investigate the health beliefs of various patients, such as discharged patients after breast cancer surgery. In this study, Cronbach's $\alpha$ coefficient of the total scale was 0.762, and Cronbach's $\alpha$ coefficients of each dimension were 0.932, 0.916, 0.892, 0.738, and 0.904, respectively, with good reliability.

*2.2.5. Data Analysis.* In this study, statistical analysis was performed with SPSS 25.0. $p < 0.05$ indicated that the difference was statistically significant.

The means and standard deviations (SDs) were used to describe the adherence of CDT, disease knowledge, health beliefs, and continuous data in sociodemographic and medical history variables, such as age and body mass index (BMI). The categorical data in the sociodemographic and medical history variables, such as education level, marital status, family residence, per capita monthly income, comorbid conditions, types of treatment for breast cancer, types of surgery for breast cancer, lymphedema location, and the severity of conscious lymphedema, are described by numbers and percentages.

Pearson correlation analysis was used to explore the correlation between disease knowledge, health beliefs, and adherence to CDT in patients with BCRL. Sociodemographic and medical history characteristics were analysed for between-group differences using two independent samples $t$ tests and one-way analysis of variance (ANOVA).

Multiple linear regression was used to explore the key influencing factors of adherence to CDT in patients with BCRL. Linear regression analysis was performed with adherence to CDT as the dependent variable and the factors that showed significant differences in single-factor analysis and correlation analysis as the independent variables. The stepwise regression method was used for multiple linear regression analysis with $\alpha_{in} = 0.05$ and $\alpha_{out} = 0.10$.

## 3. Results

The study provided 160 questionnaires, and there was actual recovery of 160 copies, of which 158 were valid questionnaires, for an effective questionnaire return ratio of 98.75%. The 158 patients diagnosed with BCRL had an average age of $52.84 \pm 10.64$ years, with a range of 33 to 82 years old, of which 45 to 59 years old accounted for the highest proportion, nearly 50%. Most of them had a college education or above (54.4%). The vast majority of the patients were married (89.2%) and had children (94.9%). Additionally, most patients with breast cancer received radiotherapy or chemotherapy in addition to surgery (88.0%). 64.6% of patients had a lymphedema course of at least 1 year, 58.9% of patients had a total duration of CDT of at least 1 year, and 55.7% of patients had a maintenance duration of CDT of at least 1 year. Lymphedema only occurred in the left or right upper limbs, accounting for 44.9% and 47.5%, respectively, and 70.9% of patients had at least 2 lymphedema symptoms. Specific sociodemographic data and medical history data of the patients are shown in Table 1.

The adherence status for CDT of BCRL patients is shown in Table 2. In this study, the average score of items was $2.61 \pm 0.50$ points, belonging to the middle level. Among all dimensions of CDT adherence, functional exercise had the lowest average score ($2.45 \pm 0.56$), followed by manual lymphatic drainage ($2.50 \pm 0.54$), pressure treatment ($2.50 \pm 0.60$), and skin care ($2.73 \pm 0.57$). In contrast, patients had the highest average score for adherence to risk factor avoidance ($3.00 \pm 0.78$). At the same time, the overall adherence rate for CDT of patients with BCRL was 65.18%. Adherence was divided into three grades: high (adherence rate $\geq 75.0\%$), medium ($50.0\% \leq$ adherence rate $< 75.0\%$), and low (adherence rate $< 50.0\%$). The majority of patients were in the middle and low levels of adherence to CDT, accounting for 72.8% and 7.0%, respectively.

In Table 3, the disease knowledge and health beliefs of patients with BCRL are presented along with their correlation with adherence to CDT. Pearson correlation analysis showed that the total score of disease knowledge and each dimension score were positively correlated with the total score of adherence to CDT ($r = 0.172 \sim 0.328$, $p < 0.05$). The total score of health belief and its scores in all dimensions

were positively correlated with the total score of adherence to CDT ($r = 0.206 \sim 0.604$, $p < 0.01$) (Table 3).

Two independent samples $t$ tests and one-way ANOVA were used to compare the adherence status for CDT of patients with different sociodemographic characteristics and medical history characteristics. The LSD-t test was further conducted for those with significant differences. The results showed that patients whose age was under 45 years, education level was junior high school and below, marital status was unmarried/divorced/widowed, number of children was 0 or 1, surgery was not combined with radiotherapy/chemotherapy, total time of CDT was at least 1 year, maintenance time of CDT was at least 1 year, location of lymphedema was only on the left upper limb, and number of lymphedema symptoms was less than 9 had lower adherence to CDT ($p<0.05$) (Table 4).

The overall CDT of 158 patients with BCRL was used as the dependent variable, and the factors with significant differences in single-factor analysis and correlation analysis were used as the independent variables. Using the stepwise regression method, multiple linear regression analysis was carried out according to the standard of $\alpha_{in} = 0.05$ and $\alpha_{out} = 0.10$.

The results of multiple linear regression analysis showed that five variables should be entered into the multiple linear regression model, including age, the number of children, the number of lymphedema symptoms, disease knowledge, and health beliefs. The coefficient of determination ($R^2$) = 0.463, and the adjusted coefficient of determination = 0.445. A total of 46.3% of the variation in the overall CDT adherence of patients with BCRL can be explained by the aforementioned factors. In other words, age, the number of children, the number of lymphedema symptoms, disease knowledge, and health beliefs are the main factors influencing the adherence to CDT of patients with BCRL (see Table 5 for specific results).

## 4. Discussion

The results showed that the CDT adherence of BCRL patients in the maintenance stage is at an average level, and approximately 80% of those is low or medium, which still needs to be improved. The reasons might be that CDT is diverse and complicated [13, 14]. Patients not only need to spend their time and effort but also cannot have a good understanding and grasp of CDT. The nonstandard operation will lead to poor treatment effects, which can further demotivate patients from adhering to the treatment. Second, CDT can disrupt the daily life of patients, particularly with pressure treatment affecting patients' clothing and activities [20, 38]. In addition, patients lack the supervision and guidance of medical workers during the maintenance stage of treatment. Patients also find it difficult to obtain the help and support of their family or friends, since lymphedema and CDT are not yet popular [11, 39]. Therefore, it is difficult for patients to maintain long-term adherence to CDT. Compared with similar studies, the adherence level of the patients in our study was lower. The reason may be that China did not introduce CDT and carry out relevant

TABLE 1: Sociodemographic and medical history characteristics ($N = 158$).

| Variable | n | % |
|---|---|---|
| Sociodemographic characteristics | | |
| Age (year) mean ± SD[1#] 52.84 ± 10.64 | | |
| <45 | 45 | 28.5 |
| 45~ | 70 | 44.3 |
| 60~ | 43 | 27.2 |
| Education level | | |
| Junior high school and below | 34 | 21.5 |
| High school/secondary technical school | 38 | 24.1 |
| Junior college | 39 | 24.7 |
| Bachelor's degree and above | 47 | 29.7 |
| Marital status | | |
| Unmarried | 3 | 1.9 |
| Married | 141 | 89.2 |
| Divorced | 6 | 3.8 |
| Widowed | 8 | 5.1 |
| Number of children | | |
| 0 | 8 | 5.1 |
| 1 | 96 | 60.7 |
| 2~ | 54 | 34.2 |
| Employment status | | |
| Employed | 92 | 58.2 |
| Unemployed | 66 | 41.8 |
| Family residence | | |
| Urban | 143 | 90.5 |
| Rural | 15 | 9.5 |
| Per capita monthly income (Chinese yuan) | | |
| <5000 | 66 | 41.8 |
| 5000~9999 | 57 | 36.1 |
| 10000~ | 35 | 22.1 |
| Type of medical expense payment | | |
| Own expense | 10 | 6.3 |
| Medical insurance[2#] | 131 | 82.9 |
| Public expense | 17 | 10.8 |
| Medical history characteristics | | |
| Surgical methods for breast cancer | | |
| Mastectomy + axillary lymph node dissection | 125 | 79.1 |
| Mastectomy + sentinel lymph node biopsy | 2 | 1.3 |
| Breast-conserving surgery + axillary lymph node dissection | 27 | 17.1 |
| Breast-conserving surgery + sentinel lymph node biopsy | 4 | 2.5 |
| Whether the operation is combined with radiotherapy/chemotherapy | | |
| Yes | 139 | 88.0 |
| No | 19 | 12.0 |
| Course of lymphedema (year) | | |
| <1 | 56 | 35.4 |
| 1~ | 25 | 15.8 |
| 2~ | 38 | 24.1 |
| 5~ | 39 | 24.7 |
| Total duration of CDT (year) | | |
| <1 | 65 | 41.1 |
| 1~ | 29 | 18.4 |
| 2~ | 42 | 26.6 |
| 5~ | 22 | 13.9 |
| Maintenance duration of CDT (year) | | |
| <1 | 70 | 44.3 |
| 1~ | 31 | 19.6 |
| 2~ | 41 | 26.0 |
| 5~ | 16 | 10.1 |
| Location of lymphedema | | |
| Left upper limb only | 71 | 44.9 |
| Right upper limb only | 75 | 47.5 |

Table 1: Continued.

| Variable | n | % |
|---|---|---|
| Others[3#] | 12 | 7.6 |
| Self-perceived lymphedema severity | | |
| Mild | 81 | 51.3 |
| Moderate | 59 | 37.3 |
| Severe | 18 | 11.4 |
| Number of lymphedema symptoms | | |
| 1 | 46 | 29.1 |
| 2~3 | 60 | 38.0 |
| 4~8 | 44 | 27.8 |
| 9~ | 8 | 5.1 |
| Whether or not with other diseases | | |
| Yes[4#] | 46 | 29.1 |
| No | 112 | 70.9 |
| BMI $(kg/m^2)^{5\#}$ mean ± SD 23.60 ± 3.03 | | |
| <18.5 | 5 | 3.2 |
| 18.5~ | 86 | 54.4 |
| 24.0~ | 49 | 31.0 |
| 28.0~ | 18 | 11.4 |

*Note.* [1#]SD, standard deviation; [2#]medical insurance includes urban residents' medical insurance, urban workers' medical insurance, new rural cooperative medical insurance, and commercial medical insurance; [3#]other locations of lymphedema include breast only, chest wall only, or two or more of left upper limb, right upper limb, breast, and chest wall; [4#]included one or some diseases, such as hypertension, diabetes, coronary heart disease, stroke, and other chronic diseases; [5#]<18.5 is too light, 18.5~ is normal, 24.0~ is overweight, and 28.0~ is obese.

Table 2: Adherence score and rate for CDT of patients with BCRL ($N = 158$).

| Variable | Average score of items ($\overline{x} \pm s$) | Adherence rate (%) |
|---|---|---|
| Adherence to CDT | 2.61 ± 0.50 | 65.18 |
| Adherence to manual lymphatic drainage | 2.50 ± 0.54 | 62.41 |
| Adherence to pressure treatment | 2.50 ± 0.60 | 62.58 |
| Adherence to functional exercise | 2.45 ± 0.56 | 61.13 |
| Adherence to skin care | 2.73 ± 0.57 | 68.33 |
| Adherence to risk factor avoidance | 3.00 ± 0.78 | 75.08 |

*Note.* Adherence rate = (actual score of adherence/highest possible score) × 100%.

Table 3: Disease knowledge and health belief scores of patients with BCRL and their correlation with CDT adherence ($N = 158$).

| Variable | Total score and score of each dimension ($\overline{x} \pm s$) | Average score of items ($\overline{x} \pm s$) | Correlation with CDT adherence ($r$) |
|---|---|---|---|
| Disease knowledge | 22.08 ± 6.34 | 0.69 ± 0.20 | 0.328** |
| Basic knowledge of CDT | 3.85 ± 1.40 | 0.77 ± 0.28 | 0.290** |
| Knowledge related to manual lymphatic drainage | 3.23 ± 1.47 | 0.65 ± 0.29 | 0.172* |
| Knowledge related to pressure treatment | 3.44 ± 1.78 | 0.57 ± 0.30 | 0.215** |
| Knowledge related to functional exercise | 4.89 ± 1.16 | 0.82 ± 0.19 | 0.318** |
| Knowledge related to skin care | 2.76 ± 1.31 | 0.55 ± 0.26 | 0.246** |
| Knowledge related to risk factor avoidance | 3.91 ± 1.18 | 0.78 ± 0.24 | 0.299** |
| Health belief | 170.82 ± 30.48 | 3.56 ± 0.64 | 0.604** |
| Personal health belief | 35.08 ± 7.86 | 3.51 ± 0.79 | 0.579** |
| Feeling capable of implementation | 24.86 ± 5.09 | 3.55 ± 0.73 | 0.564** |
| Feeling controlled | 21.86 ± 4.36 | 3.64 ± 0.73 | 0.549** |
| Feeling resourceful | 45.26 ± 9.20 | 3.23 ± 0.66 | 0.532** |
| Feeling threatened | 37.49 ± 8.97 | 3.41 ± 0.82 | 0.206** |

*Note.* ** $p < 0.01$; * $p < 0.05$; $r = 0.1 \sim 0.3$ is a weak correlation, $0.3 \sim 0.5$ is a medium correlation, and $0.5 \sim 1.0$ is a strong correlation.

application research until 2008, and the expert consensus on the diagnosis and treatment of lymphedema was not released until 2020 [29]. The development of CDT is not ideal at present. This suggests that lymphedema therapists need to emphasize the significance of long-term maintenance treatment for patients with BCRL and encourage patients to integrate CDT into their lives and form habits. In addition, because adherence to functional exercise, manual lymphatic

TABLE 4: Single-factor analysis of the influence of sociodemographic data and medical history data of patients with BCRL on adherence to CDT ($N = 158$).

| Variable | $n$ | $\overline{x} \pm s$ | $t/F$ | $p$ |
|---|---|---|---|---|
| Sociodemographic data | | | | |
| Age (year)$^\triangle$ | | | **3.165** | **0.045*** |
| ①<45 | 45 | 90.69 ± 20.32 | | |
| ②45~59 | 70 | 98.86 ± 17.60 | | |
| ③60~ | 43 | 98.60 ± 16.80 | | |
| ②>①* ③>①* | | | | |
| Education level$^\triangle$ | | | **4.301** | **0.015*** |
| ①Junior high school and below | 34 | 88.44 ± 18.01 | | |
| ②High school/secondary technical school | 38 | 97.97 ± 18.27 | | |
| ③College and above | 86 | 98.97 ± 18.03 | | |
| ②>①* ③>①** | | | | |
| Marital status$^\&$ | | | **−2.049** | **0.042*** |
| Unmarried/divorced/widowed | 17 | 87.88 ± 18.70 | | |
| Married | 141 | 97.50 ± 18.23 | | |
| Number of children$^\triangle$ | | | **4.105** | **0.018*** |
| ①0 | 8 | 84.75 ± 12.88 | | |
| ②1 | 96 | 94.69 ± 19.88 | | |
| ③2~ | 54 | 101.35 ± 15.10 | | |
| ③>①* ③>②* | | | | |
| Employment status$^\&$ | | | −0.039 | 0.969 |
| Employed | 92 | 96.41 ± 17.98 | | |
| Unemployed | 66 | 96.53 ± 19.25 | | |
| Family residence$^\&$ | | | −0.485 | 0.628 |
| Urban | 143 | 96.23 ± 17.95 | | |
| Rural | 15 | 98.67 ± 23.40 | | |
| Per capita monthly income (Chinese yuan)$^\triangle$ | | | 0.161 | 0.852 |
| <5000 | 66 | 97.39 ± 20.10 | | |
| 5000~9999 | 57 | 95.51 ± 17.50 | | |
| 10000~ | 35 | 96.26 ± 17.12 | | |
| Type of medical expense payment$^\triangle$ | | | 0.050 | 0.952 |
| Own expense | 10 | 97.70 ± 15.09 | | |
| Medical insurance | 131 | 96.50 ± 18.76 | | |
| Public expense | 17 | 95.41 ± 18.84 | | |
| Medical history data | | | | |
| Surgical methods for breast cancer$^\&$ | | | 0.987 | 0.325 |
| Axillary lymph node dissection | 152 | 96.75 ± 18.63 | | |
| Sentinel lymph node biopsy | 6 | 89.17 ± 12.25 | | |
| Whether the operation is combined with radiotherapy/chemotherapy$^\&$ | | | **2.671** | **0.008**** |
| Yes | 139 | 97.88 ± 18.53 | | |
| No | 19 | 86.05 ± 14.52 | | |
| Course of lymphedema (year)$^\&$ | | | 1.530 | 0.128 |
| <1 | 56 | 99.48 ± 19.97 | | |
| 1~ | 102 | 94.80 ± 17.45 | | |
| Total duration of CDT (year)$^\&$ | | | **2.098** | **0.038*** |
| <1 | 65 | 100.11 ± 19.51 | | |
| 1~ | 93 | 93.91 ± 17.34 | | |
| Maintenance duration of CDT (year)$^\&$ | | | **2.066** | **0.041*** |
| <1 | 70 | 99.83 ± 18.98 | | |
| 1~ | 88 | 93.78 ± 17.68 | | |
| Location of lymphedema$^\triangle$ | | | **3.886** | **0.023*** |
| ①Left upper limb only | 71 | 93.04 ± 19.16 | | |
| ②Right upper limb only | 75 | 100.64 ± 17.07 | | |
| ③Others | 12 | 90.58 ± 18.32 | | |
| ②>①* | | | | |
| Self-perceived lymphedema severity$^\triangle$ | | | 0.266 | 0.770 |
| Mild | 81 | 97.09 ± 18.08 | | |
| Moderate | 59 | 95.80 ± 20.24 | | |
| Severe | 18 | 95.83 ± 14.39 | | |
| Number of lymphedema symptoms$^\triangle$ | | | **3.219** | **0.043*** |

TABLE 4: Continued.

| Variable | n | $\overline{x} \pm s$ | t/F | p |
|---|---|---|---|---|
| ①1 | 46 | 93.04 ± 21.46 | | |
| ②2~8 | 104 | 96.89 ± 16.80 | | |
| ③9~ | 8 | 110.50 ± 15.05 | | |
| ③>①* ③>②* | | | | |
| Whether or not with other diseases[&] | | | 0.017 | 0.987 |
| Yes | 46 | 96.50 ± 17.90 | | |
| No | 112 | 96.45 ± 18.76 | | |
| BMI (kg/m²)[△] | | | 0.582 | 0.628 |
| <18.5 | 5 | 100.20 ± 12.11 | | |
| 18.5~ | 86 | 95.13 ± 19.14 | | |
| 24.0~ | 49 | 99.04 ± 18.23 | | |
| 28.0 | 18 | 94.78 ± 17.56 | | |

*Note.* [&]Two independent samples *t*-test, [△]single-factor analysis of variance; ** $p < 0.01$; * $p < 0.05$; significant results are presented in bold.

TABLE 5: Multiple linear regression analysis of adherence to CDT in patients with BCRL ($N = 158$).

| Independent variables | B | SE | B' | t | p | $R^2$ | Collinearity test | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Tolerance | VIF |
| (Constant) | 28.531 | 6.845 | | 4.168 | <0.001*** | 0.463 | | |
| Health belief | 0.326 | 0.038 | 0.538 | 8.618 | <0.001*** | | 0.908 | 1.101 |
| *Number of children* | | | | | | | | |
| 1 | Reference | — | — | — | — | | | |
| 2~ | 7.427 | 2.317 | 0.191 | 3.205 | 0.002** | | 0.991 | 1.009 |
| Disease knowledge | 0.484 | 0.180 | 0.167 | 2.686 | 0.008** | | 0.916 | 1.092 |
| *Number of lymphedema symptoms* | | | | | | | | |
| 1 | Reference | — | — | — | — | | | |
| 9~ | 10.449 | 5.037 | 0.124 | 2.074 | 0.040* | | 0.981 | 1.019 |
| *Age (year)* | | | | | | | | |
| 60~ | Reference | — | — | — | — | | | |
| <45 | −5.077 | 2.473 | −0.125 | −2.053 | 0.042* | | 0.961 | 1.041 |

*Note.* *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

drainage, and pressure treatment is relatively low, in the initial stage of treatment, lymphedema therapists need to strengthen the guidance of self-manual lymphatic drainage and pressure treatment to ensure that patients can correctly and skilfully conduct the treatment at the maintenance stage of treatment. At the same time, explaining the function and principle of functional exercise can help patients truly realize the necessity of adhering to functional exercise.

The correlation analysis results indicated a positive association between the disease knowledge of BCRL patients and adherence to CDT. Furthermore, the multifactor analysis demonstrated that disease knowledge was the key factor affecting adherence to CDT. This can be explained by the HBM [24–26]. The theory believes that knowledge structure factors belong to influencing and restricting factors, which can directly affect and restrict the individual's health behaviour and can indirectly affect the individual's health behaviour by influencing health belief. Therefore, the patient's disease knowledge can directly or indirectly affect adherence to CDT. At the same time, the theoretical model of knowledge, attitude, and practice can also explain the results. The theory believes that acquiring knowledge is the basis of forming behaviour. Therefore, only after acquiring knowledge of lymphedema disease can patients adhere to

CDT. Previous studies have shown similar results. Research by Dean et al. [27] shows that patients with a lack of knowledge do not know how to deal with lymphedema or how to overcome problems encountered in the treatment of lymphedema. The research results of Sherman et al. [40] also indirectly confirmed this point. The better the patients handle the knowledge of lymphedema prevention after breast cancer surgery, the higher their adherence to lymphedema risk management behaviour will be. Therefore, lymphedema therapists need to strengthen the health education of patients, constantly consolidate and deepen the patients' memory at the initial stage of treatment, and use question assessment to correct or supplement patients' incorrect or inaccurate knowledge. For patients in the maintenance stage of treatment who are undergoing home treatment, lymphedema therapists can popularize knowledge and answer questions for patients through WeChat patient groups, WeChat official accounts, follow-up systems, etc.

It could also be found that health belief is a crucial factor influencing CDT adherence. The higher the level of health belief of patients with BCRL was, the higher the level of CDT adherence would be. This can be explained by the HBM [24–26], which believes that health beliefs can directly affect

an individual's health behaviour, so the patient's health beliefs can directly impact adherence to CDT. At the same time, according to the model of knowledge, attitude, and practice theory, correct belief and positive attitude are the driving forces behind healthy behaviours. Hence, the higher the level of health belief is, the higher the adherence level for CDT will be. Therefore, medical personnel should let patients fully understand the benefits of CDT and the harm of giving up CDT. Patient and meticulous teaching guidance shall be given to patients to enable them to have sufficient ability to independently conduct CDT at the maintenance stage. Patients' social support systems should be fully mobilized, patients' family members and friends can also be encouraged to participate in treatment activities, and exchanges and sharing activities among patients can be held to enhance patients' confidence in coping with diseases and overcoming difficulties. Intervention programs can also be developed based on the HBM to improve the adherence level of patients for CDT.

In addition to disease knowledge and health beliefs, age, the number of children, and the number of lymphedema symptoms in sociodemographic and medical history characteristics are also the main influencing factors for adherence to CDT of patients with BCRL.

The study showed that patients under the age of 45 had a lower adherence to CDT compared to other age groups. This may be attributed to the fact that patients younger than 45 years old bear the dual responsibilities of society and family, leaving them with little time to prioritize their role as patients and adhere to CDT, which requires a significant amount of time and effort. Additionally, since all the patients in this study were women, more women chose the role of "self-sacrifice" [41] and put their own problems and needs in the back position, leading to low adherence of these young patients for CDT. To address this issue, healthcare professionals should encourage young patients to prioritize their health, increase their awareness of CDT adherence, and find ways to balance their multiple roles.

The number of children a patient has is closely related to adherence to CDT. Patients with two or more children are more likely to adhere to CDT than those with no or only one child. The reason may be that the complex treatment methods for patients are easier to master for younger patients' children, so patients' children can provide help and guidance during the treatment process. If the number of children is at least 2, the children can take care of the patient together or in turn, urge the patient to have treatment and give more social support to the patient. In addition, the children of patients are the spiritual and emotional support of patients. The greater the number of children is, the greater the confidence and determination of patients to adhere to treatment will be. This is contrary to the qualitative research results of Radina et al. [42] and Jeffs et al. [28]. The reason may be that the average age of the patients in this study was more than 50 years old, and most of their children had grown up and could live independently. It is suggested that caregivers focus on patients with no more than one child as a priority group and develop appropriate interventions for them to improve their CDT adherence.

The severity of lymphedema is also a key factor affecting adherence to CDT. The results showed that patients with less than 9 symptoms of lymphedema had lower adherence to CDT. This might be because the severity of lymphedema in such patients is relatively light, and it is difficult to feel the threat of lymphedema and the importance and necessity of CDT. Ridner et al. [43] also discovered that the fewer symptoms of lymphedema there were, the less time the patient spent on the treatment and nursing activities of lymphedema. Nursing workers are suggested to emphasize the importance of CDT in health education for patients with fewer symptoms.

Of interest, our study revealed that the site of lymphedema is also a factor affecting adherence to CDT, and patients with lymphedema in the right upper limb have higher adherence to CDT. This may be because most individuals are right-handed, and lymphedema in the dominant limb can significantly impact their daily lives. Consequently, patients with lymphedema in the right upper limb will feel the greater threat of lymphedema, pay more attention to CDT, and have a higher level of adherence to CDT. This suggests that healthcare professionals need to increase their focus on patients with left upper limb lymphedema, which can be done by improving their level of knowledge, beliefs, and thus adherence to CDT.

*4.1. Limitations and Implications.* When interpreting the findings of this study, some possible limitations need to be considered. The sampling site of this study is only a grade A tertiary tumour hospital in Guangzhou. No investigation has been carried out on patients treated in other provinces and cities, other grades or other types of hospitals. Therefore, the representativeness of the sample may be limited. In addition, the survey was carried out in the form of a questionnaire, which is subjective to some extent, and the results may have some deviation.

Therefore, future studies on the adherence of BCRL patients to CDT should consider increasing the sample size and conducting multicentre surveys of BCRL patients in various types of hospitals. Interventional research can also be carried out on disease knowledge, health beliefs, and other aspects to explore more effective intervention measures to improve adherence to CDT among patients. It is also possible to carry out qualitative research on BCRL patients undergoing CDT, deeply understand patients' views on CDT, explore the promotion and impediment factors of patients adhering to CDT, and provide the theoretical basis for further adjustment and improvement of clinical nursing services.

## 5. Conclusion

In conclusion, the adherence to CDT of BCRL patients is at a moderate level, indicating that there is still room for improvement. Patients who are younger or have fewer children, fewer symptoms of lymphedema, a low level of disease knowledge, and a weak level of health beliefs have lower adherence to CDT. Medical personnel should pay

more attention to such patients to help them better adhere to CDT.

## Data Availability

## Conflicts of Interest

## Acknowledgments

## Supplementary Materials

Electronic supplementary material S1: the measurement questionnaires used in this study, including the specifics of General Information Questionnaire, Breast Cancer-Related Lymphedema Disease Knowledge Questionnaire, Health Belief Scale, and Complete Decongestion Therapy Adherence Questionnaire for Patients with Breast Cancer-Related Lymphedema. Electronic supplementary material S2: the detailed process of developing Complete Decongestion Therapy Adherence Questionnaire for Patients with Breast Cancer-Related Lymphedema and Breast Cancer-Related Lymphedema Disease Knowledge Questionnaire. (*Supplementary Materials*)

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