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Original Article

Adherence to complete decongestive therapy in patients with postmastectomy lymphedema and related factors

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ABSTRACT

Objectives: The study aimed to determine the rates of adherence to phase 2 components of complex decongestive therapy (CDT) and related factors among patients with postmastectomy lymphedema.

Patients and methods: This cross-sectional study included 90 female patients (mean age: 54.4±8.0 years; range, 24 to 65 years) with unilateral postmastectomy lymphedema who completed chemotherapy or radiotherapy and had previously undergone CDT phase 1 at our clinic or elsewhere between May 2018 and May 2019. Patients were included in the study at their usual visit to the lymphedema polyclinic. After physical examination, study questionnaires that involved patients' demographic and clinic data and Lymphedema Quality of Life scores were recorded. Patients who applied CDT phase 2 methods four days a week or more frequently were considered adherent, while those who applied these methods less frequently or who never applied these methods were considered nonadherent. The body mass index (BMI) scores were classified based on the criteria of the World Health Organization.

Results: Lymphedema stages of the patients were Stage I in 33.3% (n=30), Stage II in 60% (n=54), and Stage III in 6.7% (n=6). The rates of adherence were 74.4% (n=67) for skin care, 46.6% (n=42) for compression garment use, 42.2% (n=38) for self-massage, 42.2% (n=38) for exercise, and 18.8% (n=17) for multilayer bandaging. The rate of adherence to the multilayer bandaging method was found to be significantly higher in the obese group (BMI >30) than in the other BMI groups.

Conclusion: Patient adherence to CDT phase 2 was not sufficient except for the skin care component. There was a significant relationship between BMI and adherence to multilayer bandaging.

Keywords: Adherence to treatment, complex decongestive therapy, lymphedema, postmastectomy lymphedema.

Lymphedema is the accumulation of protein-rich interstitial fluid that develops due to inadequate lymphatic drainage in the presence of normal capillary filtration.[1] Secondary lymphedema occurs as a result of direct or indirect damage or functional failure of developmentally normal lymphatic vessels or lymph nodes. In developed countries, cancer treatment is the main cause of secondary lymphedema.[2] The incidence of postmastectomy lymphedema (PMLE) varies between 6 and 48% depending on the patient's history of axillary surgery and radiotherapy.[3]

The currently accepted gold standard treatment method for PMLE is complex decongestive therapy (CDT), which is a two-phase treatment. In phase 1, the aim is to provide rapid decongestion through the application of methods by an experienced team and the education of the patient about how to apply these methods. The aim of phase 2 is to ensure that decongestion achieved in phase 1 is maintained by the patient throughout their life. Phase 1 covers the components of manual lymphatic drainage, compression garments/bandages, skin care techniques, arm exercises that stimulate lymph movement, proper nutrition, and weight control. Phase 2 aims to ensure the application of compression garments/bandages, self-massage, skin care, and arm exercises by the patient and the continuation of proper nutrition and weight control.[4] The continuation of gains achieved

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in CDT phase 1 is only possible through the patient's adherence to phase 2 treatment. Lymphedema is a lifelong condition, and therefore, the patient plays a key role in its treatment. Lifelong self-management is required to slow the progression of lymphedema and reduce its adverse medical consequences.

It has been shown that self-care practices in patients with lymphedema are applied at suboptimal rates ranging between 40 and 50%.[5] In a study comparing breast cancer cases with and without lymphedema, it was found that comorbidities such as obesity, orthopedic problems, and hypertension were more common in the lymphedema group, and these could negatively affect adherence to treatment by reducing the quality of life of the patients.[5] In a review, psychological and psychosocial factors, such as inadequate social and familial support, length of time devoted to lymphedema treatment, insufficient health insurance, and financial burden of treatment, were listed as reasons that reduce adherence to treatment.[4]

This study aimed to determine the rates of adherence to phase 2 components of CDT and related factors among patients with PMLE. We consider that identifying these factors and making changes to increase patient adherence will increase the long-term efficacy of lymphedema treatment.

PATIENTS AND METHODS

In this cross-sectional study, 90 consecutive female patients (mean age: 54.4±8.0 years; range, 24 to 65 years) who presented to the lymphedema outpatient clinic of the Ankara Physical Medicine and Rehabilitation Training and Research Hospital between May 2018 and May 2019 included. The inclusion criteria of the study were being aged between 24 and 65 years, having undergone surgical treatment for breast cancer, having completed chemotherapy or radiotherapy, having unilateral upper extremity lymphedema, and having received CDT. There were no inclusion criteria for CDT duration. Patients who previously received CDT at any time or anywhere were included. The exclusion criteria were having lymphedema due to causes other than PMLE, primary lymphedema, and bilateral lymphedema.

The patient history was taken and physical examinations were performed by the same physiatrist. Lymphedema staging was made according to the criteria of the International Society of Lymphology.[6] Age, sex, educational level, occupation, marital status, and number of children were recorded. Body mass index (BMI) was calculated. The BMI scores were classified based on the criteria of the World Health Organization.[7] Dominant hand, affected extremity side, time elapsed since surgical treatment, duration of lymphedema, and comorbidities (hypertension, diabetes mellitus, coronary artery disease, hypothyroidism, neuropathy, and others) were recorded. The patients were asked whether they had been informed about lymphedema.

The arm version of the Lymphoedema Quality of Life (LYMQOL) scale was used to evaluate the quality of life of the patients. This tool evaluates the effect of upper extremity lymphedema on quality of life under four main domains: symptoms, body image/appearance, function, and mood. The response options are scored from 1 to 4. The total score is divided by the number of items to calculate the domain scores. A high score indicates poor quality of life. In the last item of the test, the patients are asked to rate their general quality of life from 0 to 10. A low score in this item indicates poor quality of life.[8] The validity and reliability study of the LYMQOL-Arm scale in Turkish patients with breast cancer-related lymphedema was undertaken by Borman et al.[9]

The patients' adherence to each phase 2 component of CDT (multilayer bandaging, self-massage, exercise, skin care, and compression garment use) were determined by recording the frequency of applying these methods. The patients who applied these methods four days a week or more frequently were considered adherent, while those who applied these methods three days a week or less frequently were considered nonadherent. Although it is generally recommended to use CDT phase 2 techniques every day, four days a week was chosen as the cut-off value for adherence since we thought that four days or more could mean most days of the week, and it could be acceptable for adherence definition. A similar calculation to ours does not exist in the literature, and therefore, this cut-off value is mainly based on our clinical experience.

Relationships between adherence to CDT phase 2 components and patients' demographics, BMI, time elapsed since surgery, lymphedema stage, lymphedema duration, information status, and LYMQOL scores were investigated.

Statistical analysis

Data were analyzed using IBM SPSS version 23.0 software (IBM Corp., Armonk, NY, USA).

The conformance of numerical variables to the normal distribution was investigated with the Kolmogorov-Smirnov test. While evaluating the data, frequency distribution (number and percentages) was given for categorical variables and descriptive statistics (mean, standard deviation, median, and interquartile range values) for numerical variables. The Mann-Whitney U test was used to investigate whether there was a difference between the two groups (adherent/nonadherent), and the chi-square test was conducted to examine the relationship between two categorical variables. A p-value <0.05 was considered statistically significant.

RESULTS

The sociodemographic data of the patients are given in Table 1. The clinical properties related to lymphedema are given in Table 2. Of the patients, 23 (25.6%) had hypertension, 19 (21.1%) had diabetes mellitus, nine (10%) had coronary artery disease, 27 (30%) had hypothyroidism, two (2.2%) had COPD, three (3.3%) had neuropathy, and 24 (26.7%) had another comorbidity. Eighty-seven (96.7%) patients were previously informed about lymphedema.

Of the patients, 42.2% (n=38) applied multilayer bandaging at home. While 44.7% (n=17) of these patients applied this method for four days a week or more frequently, 31.6% (n=12) applied it for three days a week, 10.5% (n=4) two days a week, and 13.2% (n=5) once a week. The rate of adherence to multilayer bandaging was 18.8% (n=17; Figure 1). While 63.2% (n=24) of the patients applied the bandage themselves, 21% (n=8) received help from their spouses, and 15.8% (n=6) received help from their children.

Self-massage at home was applied by 72.2% (n=65) of the patients. While 58.5% (n=38) of these patients applied this method for four days a week or more frequently, 21.5% (n=14) applied it three days a week, 10.8% (n=7) applied it two days a week, and 9.2% (n=6) applied it once a week. The rate of adherence to treatment was 42.2% (n=38) for the self-massage component of CDT (Figure 1).

TABLE 1
Demographic data of the patients (n=90)

	n	%	Mean±SD	Median	IQR
Age (year)			54.4±8.04	55	12
Body mass index (kg/m^2)			29.4±4.7	29.4	6.2
Body mass index groups (kg/m^2)					
Normal weight (18.5-24.9)	18	20			
Overweight (25.0-29.9)	34	37.8			
Obese (>30)	38	42.2			
Dominant arm					
Right	83	92.2			
Marital status					
Married	73	81.1			
Single	3	3.3			
Widow	14	15.6			
Children					
Yes	83	92.2			
No	7	7.8			
Number of children	2	2			
Educational level					
Illiterate	2	2.2			
Primary school	39	43.3			
Middle school	6	6.7			
High school	14	15.6			
Higher education	29	32.2			
Employment status					
Employed	18	20			
Unemployed	60	66.7			
Unemployed since lymphedema development	12	13.3			

SD: Standard deviation; IQR: Interquartile range.

TABLE 2
The clinical properties related to lymphedema

	n	%	Mean±SD	Median	IQR
Lymphedema stage					
I	30	33.3			
II	54	60			
III	6	6.7			
Lymphedema side					
Right	39	43.3			
Left	51	56.7			
Lymphedema duration (month)			61.7±66.4	36.0	58.0
Time from surgery to lymphedema development (month)			26.4±36.0	12.0	30.0

SD: Standard deviation; IQR: Interquartile range.

Of the patients, 66.7% (n=60) exercised at home. While 63.3% (n=38) of these patients performed exercises for four days a week or more frequently, 16.7% (n=10) performed them three days a week, 10% (n=6) performed the exercises two days a week, and 10% (n=6) performed them once a week. The rate of adherence to treatment was 42.2% (n=38) for the exercise component of CDT (Figure 1).

Skin care was applied at a rate of 83.3% (n=75). In this group of patients, 89.4% (n=67) applied this component for four days a week or more frequently, 9.3% (n=7) applied it three days a week, and 1.3% (n=1) applied it two days a week. The rate of adherence to treatment was 74.4% (n=67) for the skin care component of CDT (Figure 1).

TABLE 3
The LYMQOL scores of the patients (n=90)

	Mean±SD	Median-IQR
LYMQOL function	1.6±0.6	1.4-0.5
LYMQOL body image appearance	2.0±0.7	1.9-1.0
LYMQOL symptoms	2.2±0.6	2.1-0.8
LYMQOL mood	2.1±0.7	2.0-1.2
LYMQOL general quality of life	6.7±1.6	7.0-3.0

LYMQOL: Lymphoedema Quality of Life; SD: Standard deviation; IQR: Interquartile range.

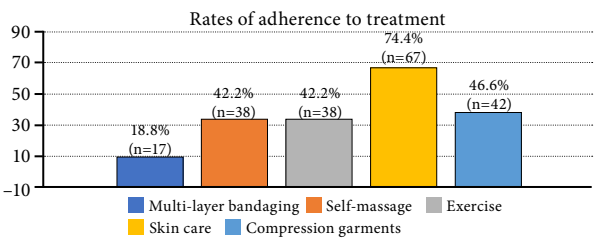

Figure 1. Rates of adherence to the components of complete decongestive therapy.

Compression garments were used by 57.8% (n=52) of the patients, of whom 80.8% (n=42) used these garments for four days a week or more frequently, 9.6% (n=5) used them three days a week, 3.8% (n=2) used them twice a week, 1.9% (n=1) used them once in two weeks, and 3.8% (n=2) used them once a month. The rate of adherence to treatment was 46.6% (n=42) for the compression garment use component of CDT (Figure 1). Furthermore, 24.4% (n=22) of the patients did not purchase compression garments for home use due to their cost (77.3%, n=17) and difficulty of use (23.8%, n=5). The rate of the patients who did have compression garments but did not use them was 17.8% (n=16), and the reason for this was reported to be difficulty in using these garments. The LYMQOL scores of the patients are presented in Table 3.

Relationship between adherence to CDT phase 2 components and age, marital status, number of children, educational level, employment status, BMI, duration of lymphedema, lymphedema side, lymphedema stage, and patient information are presented in Table 4. There was a statistically significant relationship between adherence to the multilayer bandaging component of CDT and BMI groups ($p<0.05$). Accordingly, the obese patients had a significantly higher rate of adherence to the multilayer bandaging method (Table 4).

The relationship between adherence to treatment components and LYMQOL scores is presented in Table 5. No significant relationship was found.

TABLE 4
The relationship between adherence to treatment components and investigated parameters

	Multi-layer bandaging		Self-massage		Exercise		Skin care		Compression garment use	
	Non-adherent	Adherent	Non-adherent	Adherent	Non-adherent	Adherent	Non-adherent	Adherent	Non-adherent	Adherent
	n (%) Med (IQR)	n (%) Med (IQR)	n (%) Med (IQR)	n (%) Med (IQR)	n (%) Med (IQR)	n (%) Med (IQR)	n (%) Med (IQR)	n (%) Med (IQR)	n (%) Med (IQR)	n (%) Med (IQR)
Age	54 (11)	58 (6)	55.5 (11)	55 (13)	55 (11)	55 (13)	57 (13)	55 (11)	55 (11,5)	55,5 (12)
Statistical analysis (z/*p*)	1.240/0.215		0.377/0.706		0.536/0.592		-0.746/0.456		0.276/0.783	
Marital status										
Married	60 (82.2)	13 (76.5)	42 (80.8)	31 (81.6)	43 (82.7)	30 (78.9)	18 (78.3)	55 (82.1)	40 (83.3)	33 (78.6)
Single	13 (17.8)	4 (23.5)	10 (19.2)	7 (18.4)	9 (17.3)	8 (21.1)	5 (21.7)	12 (17.9)	8 (16.7)	9 (21.4)
Statistical analysis (χ^2/*p*)	0.295/0.731		0.009/0.923		0.201/0.654		0.164/0.760		0.332/0.565	
Number of children	2 (2)	2 (1)	2 (2)	2 (1)	2 (2)	2 (2)	2 (3)	2 (2)	2 (1)	2 (2)
Statistical analysis (z/*p*)	1.050/0.294		0.620/0.535		0.832/0.405		-0.933/0.351		-0.601/0.548	
Educational level										
Primary school	36 (49.3)	11 (64.7)	24 (46.2)	23 (60.5)	24 (46.2)	23 (60.5)	12 (52.2)	35 (52.2)	25 (52.1)	22 (52.4)
High school	11 (15.1)	3 (17.6)	9 (17.3)	5 (13.2)	9 (17.3)	5 (13.2)	4 (17.4)	10 (14.9)	7 (14.6)	7 (16.7)
Higher education	26 (35.6)	3 (17.6)	19 (36.5)	10 (26.3)	19 (36.5)	10 (26.3)	7 (30.4)	22 (32.8)	16 (33.3)	13 (31)
Statistical analysis (χ^2/*p*)	2.066/0.356		1.824/0.402		1.824/0.402		0.098/0.952		0.102/0.950	
Employment status										
Unemployed	57 (78.1)	15 (88.2)	41 (78.8)	31 (81.6)	42 (80.8)	30 (78.9)	20 (87)	52 (77.6)	40 (83.3)	32 (76.2)
Employed	16 (21.9)	2 (11.8)	11 (21.2)	7 (18.4)	10 (19.2)	8 (21.1)	3 (13)	15 (22.4)	8 (16.7)	10 (23.8)
Statistical analysis (χ^2/*p*)	0.888/0.507		0.102/0.749		0.046/0831		0.934/0.334		0.714/0.398	
BMI										
Normal weight	18 (24.7)	0 (0)	12 (23.1)	6 (15.8)	13 (25)	5 (13.2)	7 (30.4)	11 (16.4)	11 (22.9)	7 (16.7)
Overweight	29 (39.7)	5 (29.4)	20 (38.5)	14 (36.8)	21 (40.4)	13 (34.2)	7 (30.4)	27 (40.3)	15 (31.3)	19 (45.2)
Obese	26 (35.6)	12 (70.6)	20 (38.5)	18 (47.4)	18 (34.6)	20 (52.6)	9 (39.1)	29 (43.3)	22 (45.8)	16 (38.1)
Statistical analysis (χ^2/*p*)	**8.574/0.014***		1.011/0.603		3.449/0.178		2.193/0.334		1.915/0.384	
Duration of lymphedema	36 (57)	40 (61)	37.5 (49.5)	36 (75)	37.5 (47.5)	34.5 (85)	42 (49)	36 (74)	35.5 (62.5)	39.5 (61)
Statistical analysis (z/*p*)	0.227/0.821		-0.356/0.722		-0.552/0.581		-0.292/0.771		0.117/0.907	
Lymphedema side										
Right	32 (43.8)	7 (41.2)	25 (48.1)	14 (36.8)	25 (48.1)	14 (36.8)	13 (56.5)	26 (38.8)	25 (52.1)	14 (33.3)
Left	41 (56.2)	10 (58.8)	27 (51.9)	24 (63.2)	27 (51.9)	24 (63.2)	10 (43.5)	41 (61.2)	23 (47.9)	28 (66.7)
Statistical analysis (χ^2/*p*)	0.040/0.842		1.129/0.288		1.129/0.288		2.188/0.139		3.207/0.073	
Dominant arm										
Right	66 (90.4)	17 (100)	49 (94.2)	34 (89.5)	49 (94.2)	34 (89.5)	22 (95.7)	61 (91)	44 (91.7)	39 (92.9)
Left	7 (9.6)	0 (0)	3 (5.8)	4 (10.5)	3 (5.8)	4 (10.5)	1 (4.3)	6 (9)	4 (8.3)	3 (7.1)
Statistical analysis (χ^2/*p*)	1.768/0.339		0.693/0.450		0.693/0.450		0.507/0.477		0.044/1.000	
Lymphedema stage										
Stage I	27 (37)	3 (17.6)	14 (26.9)	16 (42.1)	18 (34.6)	12 (31.6)	5 (21.7)	25 (37.3)	18 (37.5)	12 (28.6)
Stage II-III	46 (63)	14 (82.4)	38 (73.1)	22 (57.9)	34 (65.4)	26 (68.4)	18 (78.3)	42 (62.7)	30 (62.5)	30 (71.4)
Statistical analysis (χ^2/*p*)	2.321/0.128		2.277/0.131		0.091/0.763		1.869/0.172		0.804/0.370	
Patient information										
Absent	3 (4.1)	0 (0)	3 (5.8)	0 (0)	3 (5.8)	0 (0)	2 (8.7)	1 (1.5)	3 (6.3)	0 (0)
Present	70 (95.9)	17 (100)	49 (94.2)	38 (100)	49 (94.2)	38 (100)	21 (91.3)	66 (98.5)	45 (93.8)	42 (100)
Statistical analysis (χ^2/*p*)	0.723/1.000		2.268/0.260		2.268/0.260		2.757/0.159		2.716/0.245	

IQR: Interquartile range; Med: Median; BMI: Body mass index; * p<0.05; ** p<0.01; z: Mann-Whitney U test; χ^2: Chi-square test.

TABLE 5
The relationship between adherence to treatment components and LYMQOL scores

	Multi-layer bandaging		Self-massage		Exercise		Skin care		Compression garment use	
	Non-adherent	Adherent	Non-adherent	Adherent	Non-adherent	Adherent	Non-adherent	Adherent	Non-adherent	Adherent
	Med (IQR)	Med (IQR)	Med (IQR)	Med (IQR)	Med (IQR)	Med (IQR)	Med (IQR)	Med (IQR)	Med (IQR)	Med (IQR)
LYMQOL, function	1.37 (0.5)	1.37 (0.62)	1.37(0.57)	1.37(0.62)	1.37 (0.5)	1.37(0.62)	1.5 (0.62)	1.3 (0.5)	1.37(0.57)	1.37 (0.37)
Statistical analysis (z/p)	0.629/0.529		0.000/1.000		0.725/0.468		-1.395/0.163		-0.253/0.800	
LYMQOL, body image appearance	1.85 (1)	1.71 (1)	2.07 (1)	1.71 (1)	1.85(0.86)	1.995 (1)	2.28(0.72)	1.85 (1)	1.85(1.08)	1.85 (0.86)
Statistical analysis (z/p)	-0.212/0.832		-1.741/0.082		-0.246/0.806		-1.633/0.103		-0.207/0.836	
LYMQOL, symptoms	2 (0.84)	2.16 (0.84)	2.16(0.67)	1.75(0.67)	2.08(0.92)	2.08(0.67)	2.33(0.83)	2 (0.84)	2.16 (1)	2 (0.67)
Statistical analysis (z/p)	0.171/0.864		-1.924/0.054		-0.484/0.628		-1.069/0.285		-1.186/0.236	
LYMQOL, mood	2 (1.16)	2 (1.17)	2.25(1.25)	1.83 (1)	1.83(1.25)	2.16(1.16)	2 (1.33)	2 (1.16)	2.16(1.08)	1.83 (1.33)
Statistical analysis (z/p)	-0.465/0.642		-1.159/0.247		0.905/0.365		-0.496/0.620		-1.224/0.221	
LYMQOL, general quality of life	7 (3)	7 (3)	7 (2.5)	7.5 (3)	7 (3)	7 (2)	7 (3)	7 (3)	7 (3)	7 (3)
Statistical analysis (z/p)	**0.480/0.631**		1.363/0.173		1.262/0.207		1.041/0.298		0.116/0.908	

LYMQOL, Lymphoedema Quality of Life; Med: Median; IQR: Interquartile range; * p<0.05; ** p<0.01; z: Mann-Whitney U test.

DISCUSSION

In this study, the majority of our patients (60%) had stage II lymphedema. The rates of adherence were 74.4% (n=67) for skin care, 46.6% (n=42) for compression garment use, 42.2% (n=38) for self-massage, 42.2% (n=38) for exercise, and 18.8% (n=17) for multilayer bandaging.

Adherence to treatment is critical in preventing the progression of PMLE.[5] Although methods to be applied are well defined, it is important to identify factors that affect how much the patient will integrate them into their life. Psychological factors, such as symptom burden, anxiety, and depression, psychosocial factors, such as social isolation, financial burden, and decreased quality of life, physiological factors, such as pain, excess weight, and skin changes, inadequate education and information on the subject, and comorbidities have been reported to be associated with decreased adherence to treatment.[5]

Adherence to PMLE treatment has been differently defined in previous studies. While some studies consider treatment adherence based on whether the CDT methods are applied regardless of their frequency, some others determine the percentage of adherence to treatment by comparing the frequency prescribed by the physician with the frequency applied by the patient or summing the scores of treatment components to which the patient adheres.[10-12] There is no set standard for measuring patient adherence to CDT. In our study, we evaluated the patients' adherence to each method separately and defined adherence to treatment based on the application of these methods four days a week or more frequently.

Some studies show that the rate of adherence to PMLE is generally between 40 and 50%.[5,13] In a study conducted with 51 patients with PMLE, it was determined that 76% of the patients used bandages or compression garments, and 60% of the patients performed self-massage and exercise.[11] In another study evaluating 166 patients, the rates of adherence to treatment were reported to be 98% for skin care, 71% for compression garments, 69% for exercise, and 65% for self-massage.[12] Brown et al.[10] found that among the 131 patients with PMLE, the rate of adherence to self-care activities was suboptimal at 69%, with the highest percentage in skin care and the lowest percentage in self-massage. In a study evaluating 48 patients with PMLE by Al Onazi et al.,[14] adherence was defined as using a compression garment seven days a week and more than 12 h a day, and they found that adherence rate of compression

garment use was 31%. In another study, 60 patients were evaluated with questionnaires after they completed CDT phase 1, and it was found that 51.7% of the patients were using compression garments.[15]

Among self-management activities, the component that the patients in our study least adhered to was multilayer bandaging. Skin care, on the other hand, had the highest adherence rate. This may be related to skin care being a part of daily care for most people. The low rate of bandaging may be related to its high cost, difficulty in application, and dependence on others. The insufficient rate of adherence to the use of compression garments can also be explained by its high cost and difficulty to use.

In more than half of the patients in our study (58.9%), the time elapsed since surgical treatment was longer than four years, while it was less than one year in only 2.2% of the patients. No significant relationship was found between adherence and time elapsed since surgery in this study. In a study examining self-care behaviors in the subclinical period in terms of PMLE, it was found that as the duration of surgical treatment increased, self-care behaviors decreased.[16] It was emphasized that this might be related to patients' inability to remember the information given or their belief that they will not develop lymphedema over the years.[16]

In this study, no significant relationship was found between the lymphedema stage and adherence to treatment. However, when interpreting this result, it should be considered that most of our patients had Stage II lymphedema.

It is noteworthy that 80% of the patients participating in our study were overweight or obese. High BMI is one of the risk factors for the development of PMLE, and it is known that approximately half of the patients with PMLE are overweight or obese.[17] In our study, the rate of adherence to the multilayer bandaging method was found to be significantly higher in the obese group (BMI >30) than in the other BMI groups. According to previous studies on this subject, this is not an expected relationship since obesity and increased severity of lymphedema increase the symptom burden of patients with PMLE, which, in turn, tends to reduce their adherence to treatment.[5] This contradicting finding may be related to the heterogeneity of our sample. Furthermore, it may be related to obese patients potentially having more difficulty using compression garments, and they may choose bandaging instead of garments.

Almost all the patients in our study (96.7%) had been previously informed about lymphedema. In a study by Borman et al.,[18] 180 patients with PMLE were examined, and the rate of patients that had previously received information about lymphedema was reported to be 19.5%. In another study, Ridner et al.[11] found that 94% of 51 patients with PMLE received education/information about self-management.

In this study, we did not find any significant relationship between adherence and educational level. This might tell us that education about lymphedema may be more necessary than high educational level for patient adherence to CDT. We also did not find any significant relationship between adherence and employment status. However, majority of our sample was unemployed, and this may have contributed to the results.

There are some limitations to this study. Although having received CDT phase 1 was an inclusion criterion, we did not question the patients about the time of application. It is obvious that time elapsed since CDT phase 1 may have an effect on patients' adherence due to their memory. The rate of patients who had been informed about lymphedema was found to be high in our study, but we did not use a method to measure the knowledge level of the patients, which constitutes a limitation. This also may have affected the rate of patient adherence to treatment. Another limitation of this study is that patients were not questioned about how many hours a day they used compression garments or bandages. This could have helped define patient adherence levels.

In conclusion, this study determined that the patients with PMLE had insufficient adherence to CDT phase 2. The low rates of multilayer bandaging and compression garment use may be related to their difficulty to use and high cost. Therefore, reducing the costs of bandages and compression garments can increase patients' adherence to these methods. There was a significant relationship between BMI and adherence to multilayer bandaging in our study. However, to better understand the relationship between adherence and other factors, more studies are needed.

Ethics Committee Approval: The study protocol was approved by the University of Health Sciences Ankara Numune SUAM Clinical Research Ethics Committee (date: 08.05.2018, no: E-18-1973). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Patient Consent for Publication: A written informed consent was obtained from each patient.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions: Idea/concept, design, control/supervision: S.U.D.; Data collection and/or processing, analysis and/or interpretation, literature review, writing the article: H.K.; Critical review: H.K., S.U.D.

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