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Orem's Self-Care Deficit Nursing Theory with Persons with Peripheral Artery Disease: A Mixed Method Study

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Abstract

This study was conducted to determine the effects of an algorithm training booklet, which was based on Orem's self-care deficit nursing theory, specific to lower extremity peripheral artery disease, on pain, activities of daily living, self-care agency, walking distance, quality of life, and other symptoms. This mixed-method study included a qualitative stage using face-to-face in-depth individual interviews and a pretest–posttest semiexperimental design quantitative stage. In-depth interviews were conducted to highlight self-care needs and symptoms and to create the booklet. The booklet's content was prepared in line with concepts of Orem's theory. The patients were educated with the direction of the booklet and evaluated on outcomes. The data were evaluated using percentage distribution, means, Mann-Whitney *U* test, and Friedman test. Three categories were identified through the thematic analysis. It was determined that patients had lower pain score and higher activities of daily living, self-care, walking distance, and quality of life scores after the training.

Keywords

algorithm, Orem, peripheral artery disease, self-care model

Peripheral artery disease (PAD) is a significant cause of morbidity and mortality worldwide, and its incidence increases with age (Aday & Matsushita, 2021; Annex & Cooke, 2021). The prevalence of PAD has exceeded 10 million people in the United States and ranges between 17.6% and 47.2% in Turkey (Önal et al., 2020; Vural et al., 2020). A common chronic atherosclerotic vascular disease, PAD is accompanied by significant health issues, such as pain, limited physical capacity, decreased functional status (Aday & Matsushita, 2021), an increased risk of cardiovascular problems (Agnelli et al., 2020), and decreased quality of life (QOL), leading to health deviations and increased self-care needs (Annex & Cooke, 2021; Wu et al., 2017). The aims of treatment and care of patients mainly include increasing physical movement, reducing pain, maintaining tissue integrity, ensuring self-care, and enhancing QOL (Aboyans et al., 2017; Conte & Vale, 2018). Several care theories and models used as guidance in achieving these goals are helpful when deciding on nursing care. Orem's self-care deficit nursing theory (SCDNT) aims mainly to help individuals who cannot perform self-care by assisting them in managing self-care needs and eliminating their lack of knowledge in this regard (Berbiglia & Thy, 2021). One of the most noteworthy duties of nurses is to support desired behavioral changes in patients with deviating self-care needs and to help them improve self-care (Yip, 2021). Algorithms provide step-by-step solutions to a specific problem and enable decision making in implementing systematic nursing care; therefore, algorithms can be valuable as written material for patient education (Merih & Kömürcü, 2015). Algorithms support verbal expression with visual elements to facilitate and reinforce learning (Yıldız, 2015). To increase the efficacy of supportive-educational approaches for patient care, it is important to provide visual expressions adapted to the nursing model to address care issues comprehensively (Kalkan & Karadağ, 2021).

However, nurses generally may not notice behaviors that can improve self-care in patients, rather focusing on pharmacological treatment in clinical practices. Studies have emphasized mixed methods, especially for evaluating patient self-care in cardiovascular surgical nursing, presenting quantitative and qualitative research results together (Dickson & Page, 2021). It is described in the literature that the use of quantitative and qualitative data together strengthens and details the results (Tashakkori et al., 2021). For this reason,

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the mixed-method study design was chosen to ensure elaboration, exemplification, and interpretation of the results gained from the study. With this in mind, we conducted in-depth interviews to determine self-care needs of patients. The content of the booklet was created using responses to qualitative interviews. Then we examined the effects of an algorithm training booklet specifically for PAD and supportive-educational nursing on pain, activities of daily living (ADLs), self-care agency (SCA), walking distance, QOL, and other symptoms.

Methods and Design

The exploratory, sequential, mixed-method study included qualitative design using face-to-face, in-depth individual interviews as well as a pretest–posttest semiexperimental design. The research was carried out sequentially. First, qualitative interviews were conducted to determine the content of the booklet. Based on the responses obtained by the qualitative method, the booklet was prepared. Finally, the patients were educated regarding the aim of the prepared booklet, and patient outcomes were evaluated (Creswell & Plano Clark, 2017). This study was conducted in the cardiovascular surgery clinic of a university hospital in the capital city of Turkey, from February 2019 to March 2020.

Participants

The following criteria were considered in both stages of the research:

Criteria for inclusion were literate patients, 18 years and older, with lower extremity PAD diagnosis and Fontaine Stage II–III.
Criteria for exclusion were patients with PAD Fontaine Stage I or IV, those with visual and hearing problems, and those not willing to participate in the study.

Qualitative Stage

The sample was initially chosen by purposive sampling, and one of the purposive sampling methods, the maximum variation sampling, was chosen for in-depth interviews. Participants were recruited through maximum variation sampling in terms of age, gender, and PAD stage. This form of sampling provides respondents who are as different from each other as possible, thus obtaining different experiences (Palinkas et al., 2015). Data saturation in qualitative research is reached when there is adequate information to reveal data that are appropriate and considered to determine the necessary number of participants for the sample (Morse, 2015; Sykes et al., 2018). Data saturation was achievable with 10 people (5 women, 5 men).

Quantitative Stage

When we reviewed the literature for similar studies to decide the optimal sample size, no similar research was found with regard to sample characteristics and data instruments used. For this reason, power analysis was conducted from the results after reaching 10 people, and the minimum number necessary to be included in the sample was calculated. The sample size was calculated with a test power of 0.90 using the G*Power 3.1.9 software program. As a result of power analysis, it was determined that 29 patients should be included at $\alpha = .05$ significance level, 0.2778 effect size, and 80% power. The study was ultimately completed with 30 patients.

Procedures and Data Collection

The data collection forms used in the research were prepared by choosing from measurement tools that could address all the concepts of Orem's SCDNT (Figure 1).

Personal Information Form. The form, prepared in line with the literature (Conte & Vale, 2018; Hashemlu et al., 2015; Kara et al., 2016), consisted of 11 questions regarding age, gender, marital status, and health status (duration, stage, surgical intervention due to PAD, chronic diseases, smoking/alcohol use, sleep pattern, and limitation of movement).

Numerical Pain Rating Scale (NPRS). An 11-point NPRS was used to measure pain on a scale from 0 to 10, with 0 as no pain and 10 as the worst possible pain (Jensen et al., 1994). Patients were asked to consider pain in the lower extremity specific to PAD while responding to pain.

The Katz Index of Independence in Activities of Daily Living (ADLs). The Katz ADL rates six self-care tasks—dressing, bathing, transferring, going to the toilet, continence, and feeding—with a high score considered as independent and 0 points considered as fully dependent (Katz et al., 1963). The ADL scale is evaluated with a score of 0 to 6 as fully dependent, 7 to 12 as semidependent, and 13 to 18 as independent. Validity and reliability studies of the Turkish test version were conducted in elderly patients by Arik and colleagues (2015), in which Cronbach's alpha reliability coefficient was .83. The scale was determined as reliable for this study ($\alpha = .90$).

Exercise of Self-Care Agency (ESCA) Scale. This ESCA 43-item scale is based on Orem's theory. A Turkish validity–reliability study was conducted by Nahcivan and Tuncel (2015); there are 35 items ($\alpha = .89$). Participants rate each item on a 5-point Likert-type scale with 0 = *very uncharacteristic of me* to 4 = *very characteristic of me*. The scale was determined to be reliable for this study ($\alpha = .92$).

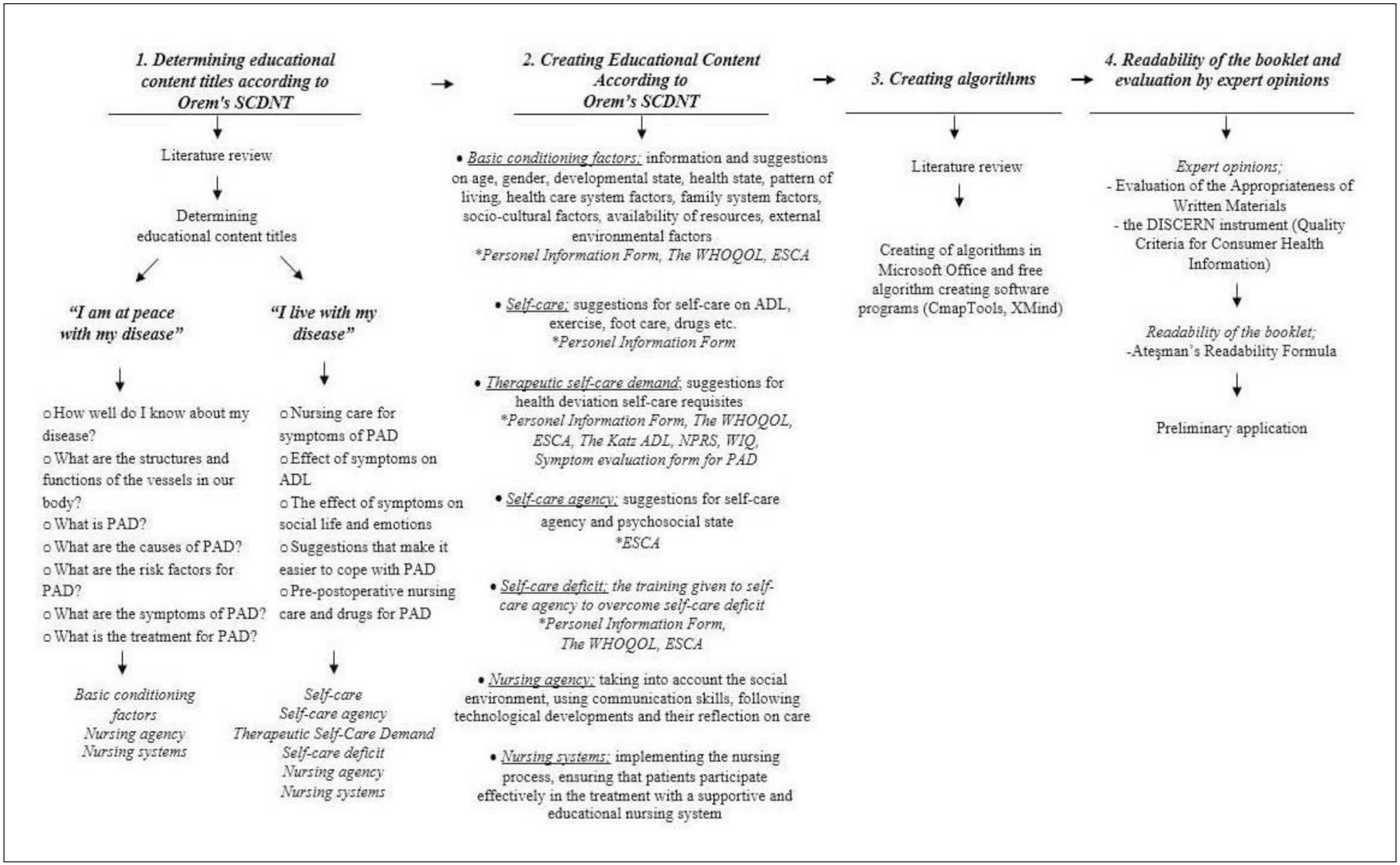

Figure 1. The algorithm training booklet preparation process according to Orem's SCDNT.

Walking Impairment Questionnaire (WIQ). The WIQ evaluated walking distance, walking speed, and the ability to climb stairs (Regensteiner et al., 2008). Kara and colleagues (2016) performed the Turkish validity–reliability study. Both total scale and subscale scores ranged between 0 and 100. Cronbach's alpha was .88 for the Turkish version of the scale and .93 for the present study.

World Health Organization Quality of Life (WHOQOL) Instrument. The WHOQOL scale evaluates one's perceived QOL and focuses on four domains: physical, psychological, social, and environmental. The Turkish validity–reliability study was performed adding national environmental domain to the scale (Eser et al., 1999). Each domain describes the QOL independently, with a higher score indicating a higher QOL. This study found Cronbach's alpha for the four domains to be .94 for physical, .94 for psychological, .96 for social, and .96 for environmental.

Symptom Evaluation Form for PAD. This form was generated by the authors after in-depth interviews, using the symptoms stated by the patients and symptoms noted in the literature (Annex & Cooke, 2021; Conte & Vale, 2018; Hashemlu et al., 2015). The form includes a total of 16 preoperative symptoms (intermittent claudication, pain, paleness/bruising, ulceration, gangrene, coldness, numbness, swelling, thickened nails, atrophy of leg muscles, reduced leg hair) and postoperative symptoms (wound drainage, impaired wound healing, bleeding, numbness, infection) that patients can answer with yes or no.

Semistructured Interview Guide for Opinions on PAD. The interview guide performed from the literature review (Hashemlu et al., 2015; Lokin et al., 2015; Schorr et al., 2015) consisted of the following nine questions:

- How do you describe your illness?
- How do you describe your feelings about your illness?
- How do you describe the effect of your illness on your activities of daily living?
- What are your experiences with your illness?
- What kind of problems do you have with your illness?
- What are the factors that facilitate self-management of your problems with your illness?
- What are the obstacles that hinder self-management of your problems with your illness?
- Could you explain what you know about your illness?
- What would you like to learn about your illness?

Expert opinions were received from eight academicians in nursing, who evaluated the content validity of this guide. The Davis technique was used to evaluate the questions used in the interview. The content validity index of the prepared guide was .89. The interview guide was also pilot-tested with a total of five participants two women and three men to determine understanding of the questions in the interview guide. These persons were not included in the sample.

Qualitative Stage Procedure

This qualitative study uses a descriptive phenomenological design. Descriptive phenomenological design describes the subjective experiences of individuals and aids the researcher's in-depth understanding of lived experiences (Willis et al., 2016). In-depth semistructured individual interviews were used to describe the perspectives of patients with PAD in regard to self-care needs and were applied to create a comprehensive training booklet. A semistructured, pilot-tested interview guide was used for interviews. Before the interviews, patients were informed about the aim of the study, that they could talk as much as they wanted, and that their voices would be recorded during the interviews, which lasted approximately 28 minutes (minimum 16, maximum 53). The researchers approached patients who were receiving their routine treatment in the patient room. Only the researcher (first author), the observer (second author), and the patient were present in the patient's room.

Algorithm Training Booklet

The algorithm training booklet was prepared in four stages (Figure 1) (Kalkan & Karadağ, 2021) and was written in the patients' language.

Determining Educational Content Titles According to Orem's SCDNT. The researcher first searched the literature to determine educational content titles (Aboyans et al., 2017; Betschart et al., 2019; Conte & Vale, 2018). The booklet consisted of two parts: "I am at peace with my disease" and "I live with my disease."

Creating Educational Content According to Orem's SCDNT. The educational content titles were also determined based on in-depth patient interviews. The booklet's content was prepared in line with concepts of Orem's SCDNT (self-care, therapeutic self-care demand, self-care agency, self-care deficit, nursing agency, and nursing systems) and an environmental concept (basic conditioning factors) (Berbiglia & Thy, 2021).

Creating Algorithms. The recommendations in the algorithms were presented in an order that the patients could follow with arrows. Each subject title was indicated using a different color; the title and the arrows used in the content were the same color to separate the subjects. The pages containing the algorithms were supported using pictures and figures (Figure 2).

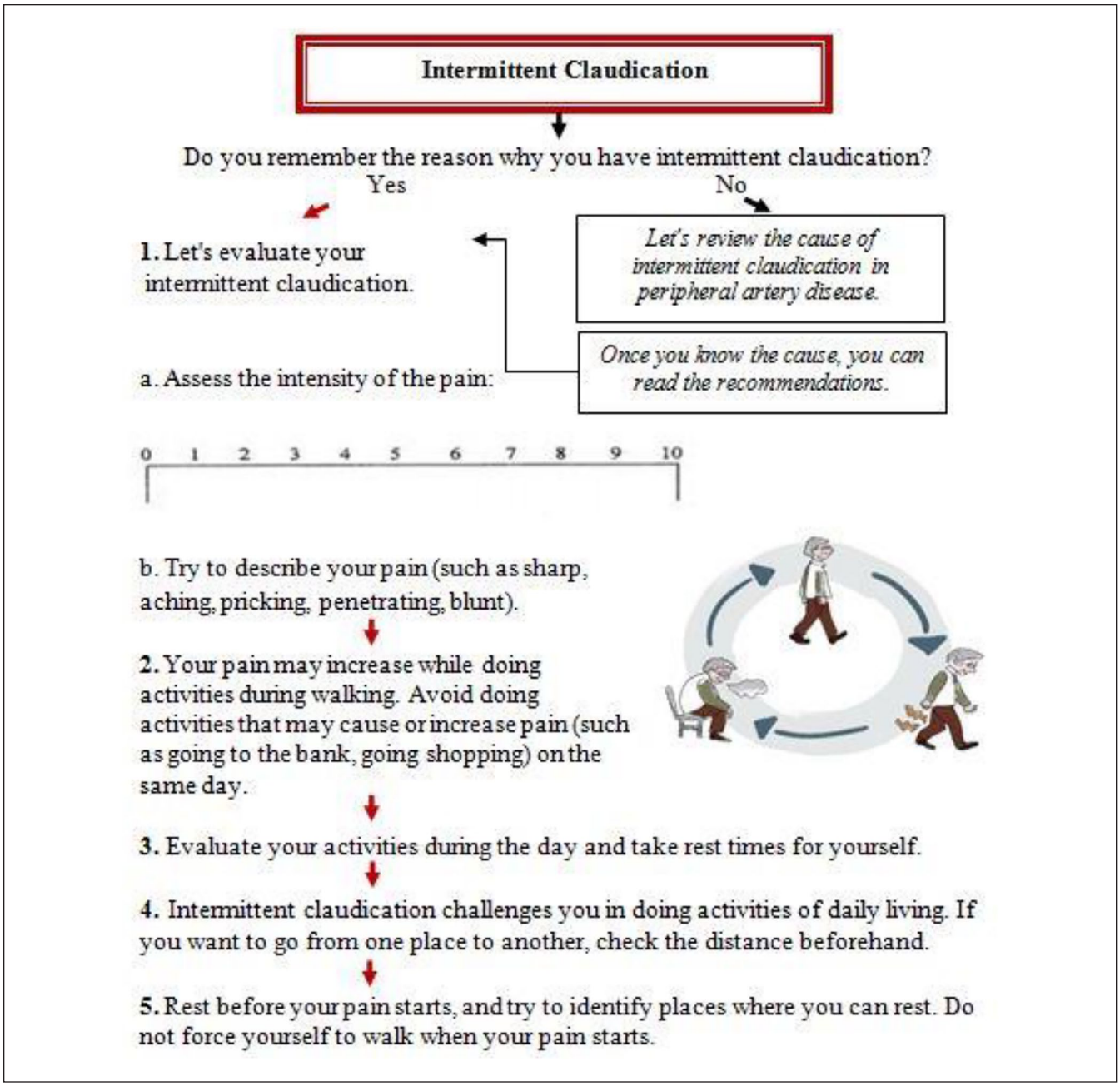

Figure 2. Training example prepared with algorithm (for therapeutic self-care demand).

Readability of the Booklet and Evaluation by Expert Opinions. A total of eight experts (academics in nursing) reported high readability for the booklet using the "Evaluation of the Appropriateness of Written Materials" and the DISCERN instrument (Quality Criteria for Consumer Health Information) (Charnock et al., 1999; Demir et al., 2008). Furthermore, the readability of the text was calculated using Ateşman's Readability Formula (Ateşman, 1997), and its readability level was determined as 76.8 (easy).

Pretest–Posttest Semiexperimental Stage Procedure

Before the training, a personal information form, NPRS, ADL, ESCA, WIQ, WHOQOL, and symptom evaluation form were completed for all patients. Study researchers were trained in conducting face-to-face interviews lasting around 45 minutes (minimum 38, maximum 53). Expository, question–answer, and demonstration teaching methods were used

in training. One week after this training, the patients were followed up in the clinic. At the third-month follow-up, patients were interviewed by phone.

Ethical Considerations

The ethical approval from Gazi University Ethics Committee (No. 77082166-302.08.01, 22/12/2017) and institutional permission (No. 42000842-605.01) were obtained to conduct the study. The participants were informed that they could withdraw from the study at any point without stating a reason, and they were not expected to pay for anything. Written informed approval forms were collected from the patients who participated voluntarily. Recordings and transcripts were stored on a password-protected device.

Data Analysis

Qualitative Data. The qualitative data were analyzed via thematic analysis using an inductive method. The COnsolidated criteria for REporting Qualitative research (COREQ) checklist was used to ensure quality reporting (Tong et al., 2007).

Trustworthiness. The criteria suggested by Lincoln and Guba's (1986) guideline were taken into account regarding validity and reliability. Approaches carried out for each component are given as follows

Credibility. To confirm patients' opinions, the interviewer checked the understanding of the questions with the participants during the interviews. During the interviews, the patients were also asked questions to confirm their statements (Can you explain in more detail? Can you describe? Is there anything else you want to mention? Did you mean this?). The observer noted emotional expressions related to the patients' statements.

Transferability. To ensure transferability, purposive sampling was performed and open-ended questions were used in the interviews. The data were divided into interrelated categories and themes in line with the conceptual framework. The data were supported by quoting directly from the patients' opinions. The interviews were transcribed without adding comments to the patients' statements and were compared with the audio recordings.

Dependability. The same researchers conducted all interviews and had experience in conducting qualitative research. Patients and researchers had not met before. All research processes were discussed with the researchers and reported (e.g., aim of the study; data collection process; data analysis; and reporting of the data). In addition, several meetings were organized to ensure the dependability of the study.

Confirmability. To provide confirmability, all data were reviewed by the researchers separately. Categories, themes, and subthemes were also confirmed by the researchers. Furthermore, data collection tools, raw data of the study, audio recordings, and observation notes were kept for confirmability.

Quantitative Data. The SPSS Version 24.0 software program was used for statistical analysis. For normally distributed measurements, two independent groups were compared by an independent-samples t test and three or more dependent groups by repeated-measures tests. For nonnormally distributed measurements, two independent groups were compared by a Mann–Whitney U test and three or more dependent groups by a Friedman test. The Bonferroni correction was applied for pairwise comparisons of variables with a significant difference for three or more groups. A value of $p < .05$ was accepted as statistically significant in the assessment of the results.

Results

Qualitative Findings of the Study

The mean age of patients was 66.60 ± 1.03 years (minimum 50 years, maximum 68 years), and half were male. Their mean duration of PAD was 46.20 ± 4.30 months, with 70% in Stage II. More than half of the patients had had a surgical intervention due to PAD (60%). Researchers determined three themes and seven subthemes based on the interviews (Table 1).

Category 1: Perception of the Disease. The two themes identified in the category "perception of the disease" were "perception of the disease's physiological domain" and "perception of the disease's psychosocial domain."

Perception of the Disease's Physiological Domain. The patients defined the disease's physiological domain as vascular occlusion, walking pain, difficulty in walking, and fatigue. One patient stated:

> *"A disease that prevents me from walking. I haven't been able to walk for a long time." (70 years old, Stage II)*

Another patient perceived the disease as follows:

> *"I have pain in my legs, which is relieved only when I get rest. I walk a lot. I think this is why I have pain." (57 years old, Stage II)*

Perception of the Disease's Psychosocial Domain. The patients defined the disease's psychosocial domain as a challenging disease to struggle with, a difficult disease, and a disturbing disease. One patient said:

Table 1. Categories, Themes, and Subthemes Identified From In-depth Individual Interviews.

Categories	Themes	Subthemes
Perception of the disease	Perception of the disease's physiological domain	Vascular occlusion
		Walking pain
		Difficulty in walking
		Fatigue
	Perception of the disease's psychosocial domain	A challenging disease to struggle with
		A difficult disease
		A disturbing disease
Perceived impact of the disease	Effects on daily life	Dressing
		Walking
		Hygiene
		Sleep
		Food preparation
		Going to toilet
		Bathing
		Shopping
	Symptoms	Pain
		Coldness
		Bruising
		Numbness
		Infection
		Edema
	Emotions	Acceptance
		Fear
		Sadness
		Discomfort
		Satisfaction from being treated
		Feeling of inconveniencing other people
		Shame
		Anxiety
Coping with the disease	Factors that facilitate coping with the disease	Living with family
		Having a carer
		Using assistive vehicles
		Walking
	Factors that make it difficult to cope with the disease	Lack of knowledge
		Treatment procedures
		Having a surgical operation

"A very difficult disease. I'm always sad as I can't do even daily activities." (73 years old, Stage II)

Another patient perceived the disease as follows:

"It requires struggle. It is a very disturbing disease." (73 years old, Stage II)

Category 2: Perceived Impact of the Disease. In the category of "Perceived impact of the disease," the themes of "effects on daily life," "symptoms," and "emotions" were determined.

Effects on Daily Life. The disease affects ADLs, including dressing, walking, hygiene, sleep, food preparation, going to the toilet, bathing, and shopping. One patient described the effect of the disease on daily life as follows:

"I have difficulty climbing stairs. Every aspect of my life has been affected. I can't bend my leg." (52 years old, Stage III)

Another patient stated:

"It affects my sleep quite a lot. I go to sleep, I have pain, then I wake up again due to pain. Nights are really tough." (70 years old, Stage II)

Symptoms. The patients described several symptoms: pain, coldness, bruising, numbness, infection, and edema. Patients described symptoms as follows:

"There's unbearable pain like nothing else." (73 years old, Stage II)

"My feet were freezing. I put my foot under my other foot as if to hide it; but this foot freezes the other one as if I just took it out of the refrigerator." (50 years old, Stage II)

Emotions. The patients' described emotions due to the disease as follows: acceptance, fear, sadness, discomfort, satisfaction from being treated, feeling of inconveniencing other people, shame, and anxiety. Patients described emotions as follows:

"I've never been demoralized, I kept on fighting, and I still do." (52 years old, Stage III)

"I'm afraid of having my foot amputated. I'm afraid of coming to the hospital. I'm afraid of surgery." (73 years old, Stage II)

Category 3: Coping With the Disease. In the category of "Coping with the disease," two themes were determined: "factors that facilitate coping with the disease" and "factors that make it difficult to cope with the disease."

Factors That Facilitate Coping With the Disease. The subthemes of the factors that facilitate coping with the disease were as follows: living with family, having a carer, using assistive vehicle,; and walking. One patient stated:

"It's good to have my children living with and helping me. I'm tired of coming to the hospital alone; now they bring me to the hospital." (72 years old, Stage II)

Another patient said:

"I have crutches, so I feel more comfortable while walking." (52 years old, Stage III)

Factors That Make It Difficult to Cope With the Disease. The factors making it difficult to cope with the disease were lack of knowledge, treatment procedures, and having a surgical operation. One patient described:

"I don't know anything about the disease. I want to be able to give information in detail, but I don't know what it would be like to live with it." (50 years old, Stage II)

Quantitative Findings of the Study

The mean age of the patients was 65.77 ± 11.15 years (minimum 55 years, maximum 72 years), and more than half (66.7%) were male. Their mean duration of PAD was 64.10 ± 11.69 months, and 53.3% were in Stage III. Most had had a surgical intervention due to PAD (53.3%). The patients' pretest and posttest NPRS mean scores at the first week were significantly higher than mean scores at the third month ($\chi^2 = 32.280$; $p < .001$). There was no remarkable difference in the patients' ADL, dressing, transferring, continence, and feeding mean scores ($p > .05$). The patients' third-month bathing mean score was significantly higher than the first week ($\chi^2 = 12.933$; $p = .002$). In addition, their third-month toileting mean score was significantly higher than at pretest ($\chi^2 = 15.647$; $p < .001$) and first-week mean scores ($\chi^2 = 11.955$; $p = .003$). A significant difference was found between the patients' ESCA mean scores at the first week and third month ($\chi^2 = 45.867$; $p < .001$). Their posttest ESCA mean scores were significantly higher than pretest scores. The patients' posttest WIQ mean scores for walking distance ($\chi^2 = 41.207$; $p < .001$), walking speed ($\chi^2 = 48.667$; $p < .001$), and ability to climb stairs ($\chi^2 = 35.387$; $p < .001$) at the third month were significantly higher than posttest mean scores at the first week. The patients' physical ($\chi^2 = 53.207$; $p < .001$), social ($\chi^2 = 32.500$; $p < .001$), and environmental area ($F = 40.460$; $p < .001$) domain mean scores at the third month were significantly higher than mean scores before and at the first week. In addition, the patients' psychological domain mean scores at the first week and third month were significantly higher than mean scores before training ($\chi^2 = 38.477$; $p < .001$) (Table 2).

Before training, the symptoms that the patients mentioned more often were pain (93.3%), intermittent claudication (63.3%), and numbness (60%). One week after training, they cited pain (76.7%), numbness (60%), and paleness/bruising (56.7%). Three months after training, thickened nails (56.7%), pain (46.7%), and numbness (36.7%) were reported (Figure 3).

Discussion

It is crucial to determine the perceptions and experiences of patients with PAD in relation to disease management and treatment adherence (Striberger et al., 2021). In this study, patients perceived PAD with physiological dimensions such as vascular occlusion, walking pain, difficulty walking, and fatigue. Studies report that patients cannot clearly define the disease process and describe it as occlusion and hardening of vessels (Gorely et al., 2015; Harwood et al., 2017). In our study, the patients described PAD as a difficult and disturbing disease that entails struggle with psychosocial dimensions, similar to reports in the literature (Gorely et al., 2015).

In the study, the perceived impact of the disease was explained as effects on daily life, symptoms, and emotions. Studies have reported that PAD has negative effects on ADLs (Galea Holmes et al., 2017; Gorely et al., 2015; Harwood et al., 2017). Our study detected that ADLs were affected for almost all patients. Several studies have revealed that pain is the primary symptom experienced (Aber et al., 2018; Gorely et al., 2015; Haile et al., 2022). In our study, almost all patients reported pain, numbness, coldness, bruising, fatigue, wounds, and swelling. They also experienced negative emotions in connection with these symptoms (Galea Holmes et al., 2017; Gorely et al., 2015; Torbjörnsson et al., 2017). In our study, a few patients reported the negative emotion of fear related to amputation and being a burden to others,

Table 2. Distribution of the NPRS, Katz ADL, ESCA, WIQ, and WHOQOL Mean Scores of the Patients.

	Baseline Assessment (0)	1-Week Follow-up (1)	3-Month Follow-up (3)	Statistical Analysis[a]
NPRS	4.60 ± 3.49	3.60 ± 2.49	1.40 ± 1.94	$\chi^2 = 32.280$ $p < .001$ [0,1-3]
Katz ADL				
Bathing	2.00 ± 0.59	1.50 ± 0.60	2.27 ± 0.52	$\chi^2 = 12.933$ $p < .001$ [1-3]
Dressing	2.40 ± 0.56	2.40 ± 0.50	2.50 ± 0.51	$\chi^2 = 1.636$ $p = .441$
Going to toilet	2.17 ± 0.59	2.30 ± 0.60	2.60 ± 0.56	$\chi^2 = 15.647$ $p < .001$ [0-3]
Transferring	1.80 ± 0.61	1.77 ± 0.43	1.93 ± 0.52	$\chi^2 = 2.471$ $p = .291$
Continence	2.83 ± 0.53	2.90 ± 0.40	2.93 ± 0.37	$\chi^2 = 3.714$ $p = .156$
Feeding	2.87 ± 0.35	2.90 ± 0.31	2.97 ± 0.18	$\chi^2 = 4.667$ $p = .097$
Total score	14.20 ± 2.49	14.17 ± 2.05	15.17 ± 2.10	$\chi^2 = 11.955$ $p < .001$ [1-3]
ESCA	85.83 ± 18.50	93.43 ± 11.54	104.90 ± 10.67	$\chi^2 = 45.867$ $p < .001$ [0-1,3] [1-3]
WIQ				
Walking distance	17.73 ± 26.25	16.58 ± 17.98	33.83 ± 20.99	$\chi^2 = 41.207$ $p < .001$ [0,1-3]
Walking speed	19.04 ± 17.96	20.92 ± 18.02	35.74 ± 20.25	$\chi^2 = 48.667$ $p < .001$ [0,1-3]
Ability to climb stairs	22.36 ± 28.16	23.75 ± 29.18	37.08 ± 29.53	$\chi^2 = 35.387$ $p < .001$ [0,1-3]
WHOQOL				
Physical	13.97 ± 4.57	15.70 ± 4.2	19.93 ± 4.54	$\chi^2 = 53.207$ $p < .001$ [0,1-3]
Psychological	18.77 ± 3.10	20.20 ± 2.82	21.13 ± 3.09	$\chi^2 = 38.477$ $p < .001$ [0-1,3]
Social	9.97 ± 1.79	10.17 ± 1.56	10.83 ± 1.60	$\chi^2 = 32.500$ $p < .001$ [0,1-3]
Environmental	27.07 ± 4.24	28.23 ± 4.21	30.00 ± 3.49	$F = 40.460$ $p < .001$ [0,1-3] [1-3]

Note. Scores are expressed as $M \pm SD$. ADL = Katz Index of Independence in Activities of Daily Living; ESCA = Exercise of Self-Care Agency Scale; NPRS = Numerical Pain Rating Scale; WHOQOL = World Health Organization Quality of Instrument; WIQ = Walking Impairment Questionnaire; (0) = Baseline Assessment; (1) = 1-Week Follow-up; (3) = 3-Month Follow-up.
[a]Friedman test (χ^2 table value).

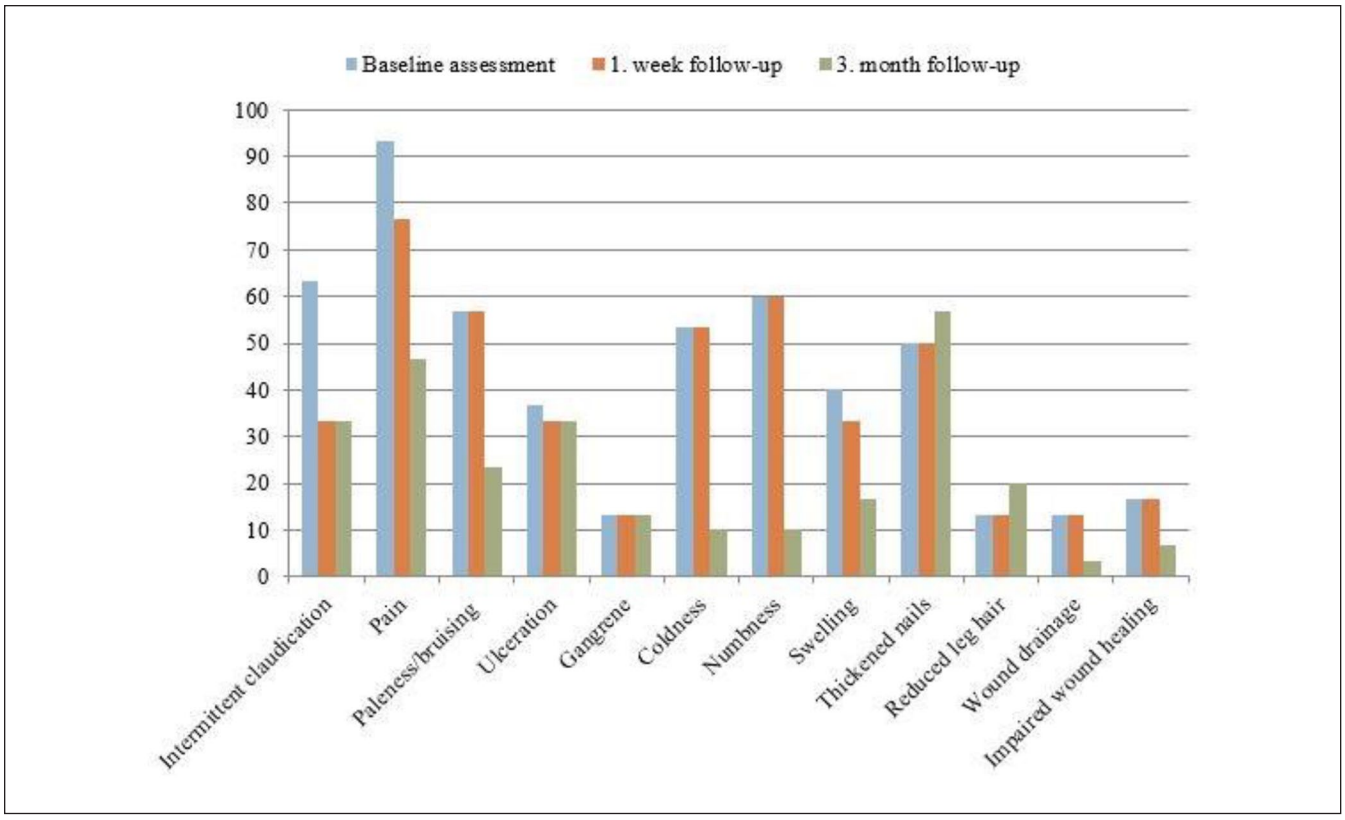

Figure 3. Symptoms experienced by the patients before baseline and at 1-week and 3-month follow-up after the training.

similar to the literature (Striberger et al., 2021; Torbjörnsson et al., 2017), and said they consider it embarrassing to stop walking due to increased pain (Gorely et al., 2015; Haile et al., 2022). Embarrassment is also one of the subthemes reported in our study. Moreover, studies have found that patients experience strong negative emotions, such as sadness, disappointment, hopelessness, frustration, anxiety, anger, and loneliness (Galea Holmes et al., 2017; Haile et al., 2022; Harwood et al., 2017). Although most of the patients in our study stated negative feelings, some reported acceptance of the disease and satisfaction with treatment. There are other studies in which patients reported accepting the disease (Gorely et al., 2015; Haile et al., 2022; Harwood et al., 2017).

Our study's last main theme was coping with the disease and included factors that facilitate or obstruct coping with the disease. In qualitative studies to determine how patients cope with PAD, they reported planning their destination in advance, resting when their pain increased, looking for alternative transportation routes, and avoiding climbing stairs, walking uphill, and rushing (Galea Holmes et al., 2017; Gorely et al., 2015; Schorr et al., 2015). Studies also emphasize walking as an important treatment method (Galea Holmes et al., 2017) and report that social and emotional support from family members and friends helps patients cope with PAD (Columbo et al., 2018). In the present study, the patients expressed similar sentiments. The study determined long treatment processes, repeated surgeries, and lack of information as factors that made it difficult to cope with PAD. Several qualitative studies have also reported that treatment procedures (Haile et al., 2022) and lack of knowledge (Aber et al., 2018; Striberger et al., 2021; Torbjörnsson et al., 2017) make it difficult to deal with PAD. In these studies, patients stated that they did not have sufficient knowledge about the disease, wanted more information about it (Harwood et al., 2017), and needed a book or guide to help them learn what awaits them in the postoperative period (Columbo et al., 2018).

In this study, training was supported by algorithms. Algorithms are recommended for use in clinics to guide medical decisions in care practices (Smits et al., 2022). Our study examined the effect of training supported by the algorithm training booklet on some patient outcomes. Pain, one of the most significant problems experienced by patients, affects every aspect of their lives (Aber et al., 2018). In our study, the patients' pain level averaged 4.60 ± 3.49 and gradually decreased after training. Studies have shown that ADLs are highly affected in patients with PAD (Galea Holmes et al., 2017; Gorely et al., 2015; Harwood et al., 2017); however, increased knowledge during treatment facilitates the ADLs of patients (Haile et al., 2022). In our study, the patients' bathing, toileting, and total mean scores were higher at the third month after training than before. Our patients' self-care agency scores increased after training, but their total mean score was low. Studies have reported that patients need and are willing to receive training and that repeated training and follow-up increase self-care motivation (Gorely et al., 2015; Lokin et al., 2015). Impairment in physical activity plays a significant role in the treatment and perception of PAD (McDermott, 2018). In addition, relevant training improves physical activity and motivates self-care in patients (Abaraogu et al., 2017). Our study found that the patients' walking distance, walking speed, and stair climbing mean scores were higher 3 months after training. Evaluating the QoL in patients is important in guiding medical interventions (Aber et al., 2018). Similar to our study, others have reported low QOL in patients with PAD (Wu et al., 2017).

This study found that the patients mainly mentioned pain, intermittent claudication, and numbness before training; pain, numbness, and paleness/bruising at the first week; and thickened nails, pain, and numbness at the third month. The fact that the symptoms of thickened nails and reduced leg hair increased after training may be because of the progression of the disease or because thickened nails and reduced leg hair were not considered signs of PAD before training and therefore not expressed previously. The patients may have learned of these symptoms as signs of PAD as a result of training and followed them more carefully afterward. Despite the increasing number of symptoms associated with PAD due to its chronic and progressive nature, the training provided had positive effects on patient outcomes.

Limitations

A number of limitations exist with this study. The study sample identified a small number of patients. In the qualitative stage, patients with different demographic characteristics (married vs. single, cultural differences, how many years with PAD) might explain different self-care experiences. In the pretest–posttest semiexperimental stage, participants were limited to those applying to the single-center study, and there was no follow-up after 3 months. Another limitation was the inability of researchers to intervene with routine treatment protocols and the drugs used by patients for symptoms after discharge. Therefore, it was impossible to determine the effect of prescribed drugs and treatment plans on the symptoms. In addition, the study lacked a control group for comparison purposes. However, this study is the first in the literature where participants are educated with an algorithm training booklet based on self-care deficit nursing theory for self-care needs of patients. It provides a detailed perspective on the self-care experiences of patients. In terms of the comprehensive booklet, above all, qualitative research of the expressions from the patients is the strength of the study.

Conclusion

The patients clearly expressed their perceptions of PAD, their perceived effects of the disease, and their views and experiences about coping with it. They described PAD, with

its physiological and psychosocial dimensions, as affecting many aspects of daily living, especially movement and sleep. They also reported several symptoms, especially pain. Patients expressed both positive and negative feelings about the disease. The training provided, using an algorithm training booklet based on Orem's SCDNT, positively affected patient care outcomes, including pain, ADLs, self-care agency, walking distance, QOL, and other health problems in patients with PAD. In conclusion, this study provided an example of an algorithm training booklet based on Orem's SCDNT for patients with lower-extremity PAD. The results point to the comprehensive training algorithm booklet, based on this nursing theory, positively affecting the ability to cope with PAD and supporting patients' self-care needs, and nurses could use it as a guide for nursing practice.

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