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Fatigue, Self-Care Behavior, and Quality of Life in Patients Undergoing Home-Based Chemotherapy with a Disposable Elastomeric Infusion Pump

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Purpose: This study aimed to examine the relationships between fatigue, self-care behavior, and quality of life (QoL) among patients receiving home-based chemotherapy with a disposable elastomeric infusion pump and to identify general and disease-related factors associated with QoL. **Methods:** Data were collected from 145 patients with various cancer types receiving home-based chemotherapy using a disposable elastomeric infusion pump. Fatigue was measured using the Korean version of the Functional Assessment of Chronic Illness Therapy–Fatigue (FACIT-Fatigue) scale. Self-care behavior was assessed with a validated self-report tool, and QoL was evaluated using the Functional Assessment of Cancer Therapy-General (FACT-G). **Results:** Fatigue was negatively correlated with QoL, whereas self-care behavior was positively correlated. Among general characteristics, occupation, meal frequency, meal portion size, and the self-reported Eastern Cooperative Oncology Group Performance Status (ECOG-PS) were significantly associated with QoL. Multiple regression analysis revealed that fatigue, self-care behavior, and self-reported ECOG-PS were significant predictors of overall QoL, with fatigue being the most influential factor. While most QoL domains were associated with fatigue and self-care behavior, the social/family well-being domain showed no significant correlation. **Conclusion:** Fatigue and self-care behavior are key factors influencing QoL in patients receiving home-based chemotherapy with a disposable elastomeric infusion pump. Targeted interventions, such as individualized fatigue management, nutritional support, and self-care education tailored to the home environment, are essential for improving patient outcomes. This study underscores the need for structured nursing models that support self-management in home-based chemotherapy with a disposable elastomeric infusion pump, particularly during public health crises such as the COVID-19 pandemic.

Key Words: *Drug therapy, Fatigue, Home Infusion therapy, Quality of life, Self-care*

INTRODUCTION

Recent advances in the early detection of cancer and medical technology have steadily improved cancer survival rates. Specifically, the five-year relative survival rate for patients diagnosed with cancer in the past five years has reached 71.5%, and the number of cancer survivors has exceeded two million since 2018. Of these, 60.1% have survived for five years or longer, indicating that cancer is increasingly considered a chronic condition to manage rather than to cure.[1]

As the number of cancer survivors increases, sustainable treatment methods and efficient use of medical resources have become important concerns. Considering the feasibility of medical service delivery, home-based chemotherapy has been reported as a safe alternative for patients with colorectal cancer undergoing anticancer treatment.[2]

Currently, some chemotherapeutic treatments in outpatient daycare units involve the use of 5-fluorouracil, administered via an elastomeric (single-use elastic) infusion device connected to an implantable port. This device delivers medication at a constant rate without an external power source, enabling patients to receive treatment at home instead of in hospitals. This approach improves quality of life (QoL) and enhances operational efficiency in hospital settings.[3]

Home-based chemotherapy with a disposable elastomeric infusion pump reduces the risk of hospital-acquired infections[4] and allows patients to receive treatment in a familiar and safe environment. In particular, the administration of chemotherapeutic drugs via a disposable elastomeric infusion pump helps maintain the immune system and improves patient satisfaction with treatment.[2,3]

Home-based chemotherapy is widely practiced in the United States. However, in South Korea, systematic research and institutional infrastructure for treatment and nursing interventions with disposable elastomeric infusion pumps are lacking. Previous domestic studies have been limited to cost comparisons with inpatient treatment[5], QoL in patients with colorectal cancer[6], and the effectiveness of video education on portable chemotherapy infusion devices.[7] Furthermore, comprehensive research on fatigue, self-care behavior, and QoL in patients undergoing home-based chemotherapy with a disposable elastomeric infusion pump is lacking.

Previous studies have reported that patients receiving home-based chemotherapy with a disposable elastomeric infusion pump experience physical symptoms, such as fatigue and treatment-related adverse effects, which directly impact their quality of life. Additionally, because patients must independently manage the infusion device, monitor symptoms, and perform coping behaviors outside the hospital, self-care behavior has been identified as a critical determinant of quality of life.[6] Therefore, it is reasonable to include fatigue and self-care behavior as key variables when examining factors influencing QoL in patients receiving home-based chemotherapy with a disposable elastomeric infusion pump.

The Korean healthcare system remains heavily hospital-centered, making it imperative to establish empirical evidence on the clinical applicability and effectiveness of home-based treatment models. Currently, health insurance reimbursement and human resource support systems prioritize in-hospital care, resulting in insufficient institutional support for home-based cancer treatments.[8]

Therefore, this study aimed to analyze the relationships among fatigue, self-care behavior, and QoL in patients undergoing home-based chemotherapy with a disposable elastomeric infusion pump. This study provides a basis for developing a community-based cancer patient management model to address medical gaps and support patients with cancer receiving outpatient anticancer treatment. Additionally, this study is significant for exploring the feasibility of implementing home-based chemotherapy with a disposable drug infusion device within the specialized field of home-based nursing.

METHODS

1. Study design

This descriptive correlational study examined the relationships among fatigue, self-care behavior, and QoL in patients receiving home-based chemotherapy with a disposable elastomeric infusion pump.

2. Study population

The study population consisted of adult cancer patients aged 19 years or older who were undergoing chemotherapy at the outpatient day-care unit of S University Hospital, located in S Metropolitan City. The sample size was determined using G*Power 3.1.9.7 for examining the relationships among fatigue, self-care behavior, and QoL.

Using a two-tailed test for multiple regression analysis with a significance level of $\alpha = .05$, power of $1-\beta = 0.80$, a medium effect size of 0.15, and 16 predictor variables, the minimum required sample size was calculated as 143 participants. To account for outpatient characteristics and the possibility of dropout, an anticipated dropout rate of approximately 10% was applied, resulting in a targeted sample of 160 participants. Of these, 145 participants completed the questionnaires.

3. Research tools
1) Fatigue in patients with cancer

Fatigue was assessed using the Korean version of the Functional Assessment of Chronic Illness Therapy–Fatigue (FACIT-Fatigue) Scale, version 4. The 13-item scale assesses fatigue experienced during the past week using a 5-point numerical rating scale (NRS) ranging from 0 ("not at all") to 4 ("very much"). Higher scores indicate lower fatigue levels. The reliability and validity of the Korean version of the FACIT-Fatigue Scale were previously demonstrated by Lee and Kim[9], who reported a Cronbach's α of .93. In this study, Cronbach's α was .94. The FACIT-Fatigue Scale was developed to measure cancer-related fatigue and has been widely used in oncology research, demonstrating strong psychometric properties. In this study, the internal consistency was excellent (Cronbach's α = .94), supporting the reliability of this instrument for patients undergoing home-based chemotherapy. This instrument was used with permission from FACIT.org.

2) Self-care behavior

Self-care behavior was assessed using a tool originally developed by Oh et al.[10] for patients with hematological malignancies and later modified by Yoon[11] for use with patients with cancer. The tools includes infection prevention (12 items), bleeding prevention (four items), nausea/vomiting (two items), nutrition (four items), exercise (three items), and stress relief (two items). Each item is rated on a 7-point Likert scale, with higher scores indicating better self-care behavior. In total, 23 items were used, excluding four items deemed unrelated to this study. Four items related to implantable port care and fever management were excluded due to limited applicability and low response validity. Most participants did not independently perform port care, and many had no fever experience. Item removal was approved by an expert panel (one oncology physician and three oncology nursing faculty). In the original tool, Cronbach's α was .85. In Yoon's[11] study, Cronbach's α was .90. In this study, Cronbach's α was .90. This instrument was used with permission from the original developer and the revising author.

3) Quality of Life

The Korean version of the Functional Assessment of Cancer Therapy-General (FACT-G) version 4, developed by Cella et al.[12] was used to assess QoL after obtaining approval from the official FACT website (www.facit.org).

Two items related to sexual culture were excluded because of a high rate of missing responses, resulting in a total of 26 questions. The reliability of the tool was measured as Cronbach's α = .87 in a study by Kim et al.[13], who translated the FACT-G into Korean and confirmed its validity. In this study, Cronbach's α was .90.

4. Data collection

Data collection was conducted with approval from the Institutional Review Board (IRB No. 4-2024-0401) of S University Hospital, located in S Metropolitan City. Eligible participants were adult cancer patients receiving home-based chemotherapy with a single-use drug infusion device at the outpatient department of S University Hospital. Only patients who understood the study and voluntarily agreed to participate were included. Data were collected from May 31, 2024, to October 4, 2024. The researcher explained the study purpose, procedures and methods to poten-

tial participants and requested their cooperation. The researcher emphasized participant anonymity and confidentiality, provided a detailed explanation of the study objectives and obtained written informed consent. After consent was obtained, a structured questionnaire was distributed. The survey required approximately 15 minutes to complete. Participants completed the questionnaire independently in separate rooms. For participants who required assistance, the researcher read the questions aloud and provided guidance as needed. A single trained researcher conducted all data collection to minimize potential surveyor bias. Completed questionnaires were collected by the researcher, and participants received a small token of appreciation. All participant information was anonymized using coded identifiers. To protect personal information, all data were stored on the researcher's password-protected computer, accessible only to the researcher. All data will be solely used for research purposes and will be destroyed three years after the completion of the study to ensure the protection of personal information.

5. Data analysis

Data analysis was performed using SPSS/WIN version 27.0 (SPSS Korea Data Solution Inc.), and the specific analysis methods were as follows. A total of 150 questionnaires were distributed; however, after excluding questionnaires with missing responses, incomplete data, or duplicate submissions, 145 questionnaires were included in the analysis.

General characteristics were analyzed using descriptive statistics including mean, standard deviation, frequency, and percentage. χ^2 and independent t-tests were used to assess group homogeneity. Differences in fatigue, self-care behavior, and QoL across participant subgroups were examined using independent t-tests and one-way ANOVA. Additionally, multiple regression analysis was conducted to identify the factors influencing QoL. Data normality was assessed through visual inspection of histograms and confirmed in consultation with a biostatistician.

RESULTS

1. Differences in QoL according to the general characteristics of patients undergoing home-based chemotherapy with a disposable elastomeric infusion pump

The participants included 91 men (62.8%) and 54 women (37.2%). Participants' age ranged from 26 to 82 years, with a mean age of 60.05 (SD = 10.20) years, and 58.6% were aged 60 years or older. Regarding educational attainment, 88.7% of participants had completed high school or higher. Of the participants, 13 (9.7%) were unmarried, and 132 (90.3%) were previously married (widowed or divorced). Regarding living arrangements, 15 (10.8%) lived alone. In terms of employment, 55 (36.7%) were unemployed. Of the participants, 76 (53%) reported religious affiliations, 143 (98.6%) did not currently consume alcohol, and 139 (95.7%) were non-smokers. Meal frequency was three or more times per day for 116 (83.3%) participants, and 99 participants (65.4%) reported consuming less than one serving per meal. A total of 117 participants (80.9%) had never experienced a fall, and 71 (47.9%) had an Eastern Cooperative Oncology Group Performance Status (ECOG-PS) score of 1 on the self-reported ECOG-PS scale. Significant differences in QoL according to the participants' general characteristics were found in the following variables: occupation (p = .010), meal frequency (p < .001), meal portion size (p = .004), and self-reported ECOG-PS (p < .001) (Table 1).

2. QoL according to disease characteristics of patients undergoing home-based chemotherapy with a disposable elastomeric infusion pump

Pancreatic cancer was the most common diagnosis (n = 66; 45.7%). The mean duration of anticancer treatment after diagnosis was 19.7 (SD = 21.2) months. The treatment period was divided into four categories, and the highest response rate was observed in the group with less than six months (38 participants, 25.5%). The disease stage was stage 4 in 92 participants(64.5%), and 127 participants (88.2%) received palliative therapy. The average number of chemotherapy sessions received by participants was 18 (SD = 14.12), with the highest proportion (36.5%) receiving 11 to 20 sessions. 83 participants (56.4%) had experienced weight loss. White blood cell counts ranged from 4,000 to 10,800 in 84 participants (57.9%), and hemoglobin levels ranged from 13.0 g/dL to 17.4 g/dL in 28 (21.0%) participants. Neutrophil counts ranged from 1,700 to 7,000 in 92 participants (63.9%). Furthermore, 90 (60.3%) participants had chronic diseases, and 19 (11.4%) reported multiple or recurrent cancers.

The ECOG-PS score determined by the physicians was 0 in 121 participants (83.0%). The most commonly administered chemotherapy regimen was FOLFIRINOX (62 participants, 42.5%). Hemoglobin levels, the presence of multiple cancers, and recurrent cancer showed statistically significant differences in QoL (p = .02), as shown in Table 2.

3. Analysis of fatigue, self-care behavior, and QoL characteristics in patients undergoing home-based chemotherapy with a disposable elastomeric infusion pump

Of the 145 participants, 44 reported a mean fatigue score of 34 or higher. The mean self-care behavior score for the sample was 109.04. The mean QoL score was 65.52. When QoL was further categorized into four subdomains, the mean score for physical health-related QoL was 16.60 (SD = 6.99); social and family-related QoL, 16.66 (SD = 4.84); emotional state-related QoL, 16.15 (SD = 5.36); and functional state-related QoL, 16.10 (SD = 6.40) (Table 3).

4. Correlation among fatigue, self-care behavior, and QoL in patients undergoing home-based chemotherapy with a disposable elastomeric infusion pump

No significant correlation was found between fatigue and self-care behavior. Fatigue was negatively correlated with overall QoL (p < .001). When QoL was categorized into four groups, physical health-related QoL (p < .001), emotional health-related QoL (p < .001), and functional health-related QoL (p < .001) were found to be negatively correlated with fatigue. However, a positive correlation (p = .005) was confirmed between self-care behavior and QoL (Table 4).

5. Regression analysis of the effect of home-based chemotherapy with a disposable elastomeric infusion pump on the QoL of patients

Multiple regression analysis was performed to identify the factors influencing QoL. Independent variables included sociodemographic and illness-related characteristics (sex, age, occupation, serving size categorized at 210 g, meal frequency, Self-reported ECOG-PS, hemoglobin level, and multiple cancers or recurrent cancer), along with fatigue and self-care behavior. To

Table 1. Sociodemographic Characteristics of Participants (*N* = 145)

Characteristics	Categories	n (%) or M ± SD	QoL Item M ± SD	t or F (p) Scheffé
Sex	Male Female	91 (62.8) 54 (37.2)	2.59 ± 0.60 2.40 ± 0.72	1.74 (.084)
Age (year)	20~49 50~59 60~69 ≥ 70	17 (13.0) 43 (28.4) 64 (44.7) 21 (13.9) 60.05 ± 10.20	2.80 ± 0.67 2.42 ± 0.72 2.55 ± 0.61 2.42 ± 0.60 2.52 ± 0.65	1.61 (.190)
Education	Elementary or lower Middle school High school College Graduate degree	10 (6.4) 8 (4.9) 49 (33.3) 66 (46.1) 12 (9.3)	2.33 ± 0.57 2.24 ± 0.47 2.49 ± 0.63 2.55 ± 0.72 2.82 ± 0.44	1.28 (.282)
Marital status	Unmarried Married	13 (9.7) 132 (90.3)	2.71 ± 0.69 2.50 ± 0.65	1.12 (.266)
Living arrangement	Living alone Living with others	15 (10.8) 130 (89.2)	2.64 ± 0.65 2.51 ± 0.66	0.74 (.461)
Occupation	Unemployed[ab] Office worker[ab] Self-employment[ab] Housewife[a] Others[b]	55 (36.7) 25 (18.8) 28 (19.3) 24 (14.7) 13 (10.4)	2.44 ± 0.50 2.75 ± 0.73 2.52 ± 0.73 2.24 ± 0.70 2.91 ± 0.58	3.47 (.010) b>ab>a
Religious affiliation	Yes No	76 (53.0) 69 (47.0)	2.55 ± 0.63 2.49 ± 0.69	0.50 (.615)
Alcohol consumption	Yes No	2 (1.4) 143 (98.6)	2.48 ± 0.63 2.52 ± 0.66	-0.09 (.933)
Smoking status	Yes No	6 (4.3) 139 (95.7)	2.59 ± 0.76 2.52 ± 0.65	0.27 (.790)
Meal frequency	Three or more times Two or fewer	116 (83.3) 29 (16.7)	2.62 ± 0.64 2.11 ± 0.56	4.00 (<.001)
Serving size (base on 210 g)	More than one bowl Just a bowlful	46 (34.6) 99 (65.4)	2.75 ± 0.57 2.41 ± 0.67	2.91 (.004)
History of falls after chemotherapy	Yes No	28 (19.4) 117 (80.9)	2.53 ± 0.64 2.52 ± 0.66	0.07 (.946)
Self-reported ECOG-PS	0[b] 1[ab] 2[ab] 3[a]	44 (33.8) 71 (47.9) 21 (13.5) 9 (4.8)	2.81 ± 0.63 2.46 ± 0.60 2.35 ± 0.66 1.94 ± 0.61	6.60 (<.001) b>ab>a

ECOG-PS= Eastern Cooperative Oncology Group Performance Status; M= mean; SD= standard deviation.

conduct the regression analysis, the autocorrelation of the dependent variable and the multicollinearity between the independent variables were examined. The autocorrelation of the dependent variable was calculated using the Durbin-Watson index, which was 1.93, indicating that it was independent without autocorrelation. Multicollinearity among independent variables was examined using the VIF index, which ranged from 1.081 to 3.728 and was less than 10, indicating no multicollinearity.

Therefore, the data were suitable for regression analysis. The regression model was statistically significant ($F = 7.598$, $p < .001$). The explanatory power of the regression model was $R^2 = 0.469$ and adjusted $R^2 = .407$. Approximately 40.7% of the total variation in QoL was explained by the model, with fatigue ($\beta = -0.472$, $p < .001$) and self-care behavior ($\beta = .141$, $p = .048$) being the most significant predictors. Fatigue was the primary factor that negatively influenced QoL ($B = -0.318$ and $\beta = -0.472; t = -$

Table 2. Illness-related Characteristics of Participants   (*N* = 145)

Variables	Categories	n (%) or M ± SD	QoL Item M ± SD	t or F (p-value)
Diagnosis	Colon Pancreas Others	42 (29.8) 66 (45.7) 37 (24.5)	2.60 ± 0.69 2.53 ± 0.66 2.42 ± 0.62	0.72 (.488)
Treatment period after diagnosis	Less than 6 months Less than 1 year Less than 2 years More than 2 years	38 (25.5) 33 (24.7) 36 (24.3) 38 (25.6)	2.45 ± 0.70 2.73 ± 0.67 2.47 ± 0.64 2.46 ± 0.60	1.55 (.204)
Cancer-staging	Stage I Stage II Stage III Stage IV	10 (7.1) 12 (8.3) 31 (20.2) 92 (64.5)	2.58 ± 0.44 2.53 ± 0.74 2.38 ± 0.61 2.56 ± 0.68	0.65 (.587)
Treatment intent at diagnosis	Adjuvant Neoadjuvant Palliative Salvage	9 (6.3) 7 (3.9) 128 (89.2) 1 (0.6)	2.56 ± 0.51 2.02 ± 0.47 2.55 ± 0.67 2.31 ± 0.00	1.51 (.214)
Number of chemotherapy administrations	1~10 11~20 21~30 More than 31	49 (32.8) 50 (36.5) 24 (15.2) 22 (15.5) 18.10 ± 14.10	2.45 ± 0.64 2.67 ± 0.70 2.31 ± 0.68 2.57 ± 0.50	1.98 (.119)
Weight change (kg)	-5 or more loss -4.9~0 loss 0.1~5 gain More than 5.1 gain	37 (25.0) 46 (31.4) 44 (31.7) 18 (11.9) -1.20 ± 5.47	2.47 ± 0.60 2.49 ± 0.66 2.63 ± 0.64 2.42 ± 0.80	0.70 (.557)
WBC	Less than 4,000 4,000~10,800 More than 10,800	41 (28.4) 84 (57.9) 20 (13.7) 7,107.3 ± 5,949.1	2.53 ± 0.69 2.52 ± 0.60 2.50 ± 0.83	0.02 (.984)
Hemoglobin	Less than 13.0 13.0~17.4	117 (79.0) 28 (21.0) 11.56 ± 1.73	2.47 ± 0.65 2.74 ± 0.65	2.02 (.045)
Neutrophil	Less than 1,700 1,700~7,000 More than 7,000	28 (19.5) 92 (63.9) 25 (16.7) 4,574.8 ± 5,278.3	2.54 ± 0.63 2.54 ± 0.63 2.43 ± 0.78	0.26 (.772)
Presence of chronic diseases	Yes No	90 (60.3) 55 (39.7)	2.45 ± 0.63 2.64 ± 0.69	-1.69 (.094)
Multiple cancers or recurrent cancer	Yes No	19 (11.4) 126 (88.6)	2.20 ± 0.59 2.57 ± 0.65	-2.35 (.020)
Physician-rated ECOG-PS	0 1 2	121 (83.0) 23 (16.3) 1 (0.6)	2.51 ± 0.67 2.60 ± 0.60 2.31 ± 0.00	0.23 (.792)
Chemotherapy regimen	FOLFIRINOX FOLFIRI FOLFOX Others	62 (42.5) 32 (22.5) 35 (23.8) 16 (11.2)	2.51 ± 0.68 2.57 ± 0.62 2.49 ± 0.69 2.55 ± 0.60	0.10 (.960)

ECOG-PS= Eastern Cooperative Oncology Group Performance Status; FOLFIRINOX includes folinic acid, fluorouracil, irinotecan, and oxaliplatin; FOLFIRI includes folinic acid, fluorouracil, and irinotecan; and FOLFOX includes folinic acid, fluorouracil, and oxaliplatin. These regimens may be combined with targeted agents such as bevacizumab or cetuximab; M= mean; SD= standard deviation;*Statistical processing conducted excluding missing values for 3 individuals.

6.321, *p* < .001), indicating that higher fatigue scores were associated with lower QoL.

This finding indicates that higher fatigue scores are associated with significantly lower QoL. However, self-care behavior positively affected the QoL, with B = .088 and β = .141, and was also statistically significant (t = 1.999, *p* = .048). This result indi-

Table 3. Fatigue, Self-care Behavior, and QoL by Participant Characteristics   (*N* = 145)

Variables (number of items)	Range (min~max)	n (%) or total M ± SD	Item range	Item M ± SD
Fatigue (Criterion 34)	0~51	25 (12.62)	0~4	1.92 ± 0.97
Self-care behavior (23)	52~160	109.04 ± 24.05	1~7	4.74 ± 1.05
QoL (26)	26~104	65.52 ± 17.01	0~4	2.52 ± 0.66
Physical well-being-QoL (7)	0~28	16.60 ± 6.99		2.37 ± 1.00
Social/family well-being-QoL* (6)	0~24	16.66 ± 4.84		2.78 ± 0.81
Emotional well-being-QoL (6)	2~24	16.15 ± 5.36		2.69 ± 0.89
Functional well-being-QoL (7)	0~28	16.10 ± 6.40		2.30 ± 0.91

QoL= quality of life; *Exclude 2 questions about sex.

Table 4. Correlation between Fatigue, Self-care Behavior, and QoL   (*N* = 145)

Variables	1 r (*p*)	2 r (*p*)	3 r (*p*)	3-1 r (*p*)	3-2 r (*p*)	3-3 r (*p*)	3-4 r (*p*)
1. Fatigue	1.00						
2. Self-care behavior (23 items)	-.07 (.387)	1.00					
3. QoL	-.59 (<.001)	.23 (.005)	1.00				
3-1. Physical well-being	-.79 (<.001)	.15 (.075)	.74 (<.001)	1.00			
3-2. Social/family well-being	.07 (.408)	.18 (.034)	.48 (<.001)	-.01 (.938)	1.00		
3-3. Emotional well-being	-.43 (<.001)	.21 (.011)	.78 (<.001)	.52 (<.001)	.15 (.069)	1.00	
3-4. Functional well-being	-.40 (<.001)	.14 (.094)	.84 (<.001)	.44 (<.001)	.39 (<.001)	.55 (<.001)	1.00

Of the 27 questions, 12 respondents had missing values for Questions 10, 25, 26, and 27; therefore, these questions were excluded from the statistical analysis; QoL= Quality of Life.

cates that higher levels of self-care behavior are associated with higher QoL (Table 5).

DISCUSSION

This study analyzed the correlation between fatigue, self-care behavior, and QoL in patients undergoing home-based chemotherapy with a disposable elastomeric infusion pump and identified the general and disease-related factors that affected QoL. The results revealed that fatigue was a major factor that lowered QoL, with significant differences observed based on general characteristics such as employment status, meal frequency and quantity, and the self-reported ECOG-PS status. This suggests that the overall health status and the ability to maintain daily living functions also significantly influence QoL in a home-based treatment environment.

In particular, the significant association between meal fre-

quency and quantity and QoL highlights the importance of proper nutrition for patients undergoing chemotherapy. These results are consistent with those of Koshimoto et al.[14], who investigated meal-related QoL in outpatients receiving chemotherapy and found that difficulties associated with meals were closely correlated with a decline in QoL. Therefore, nurses should regularly assess patients' eating habits, changes in appetite, and nutritional intake, and establish customized nutritional intervention plans based on these assessments.

Fatigue was significantly and negatively correlated with QoL, which is consistent with the findings of Berger et al.[15]. Cancer-related fatigue is not alleviated by rest or sleep alone and negatively affects physical, mental, emotional, and social functioning. Furthermore, fatigue management in cancer patients requires a multidimensional approach beyond controlling physical symptoms, including family education and psychosocial interventions. Kallich et al.[16] showed that when fatigue scores associ-

Table 5. Results of Regression Analysis of Variables Affecting QoL (*N* = 145)

Variables	B	SE	β	t	p	Tolerance	VIF
Sex (Ref: female)	-0.04	0.11	-.03	-0.32	.749	.58	1.74
Age	-0.00	0.01	-.04	-0.50	.620	.67	1.49
Occupation (Ref: housewife)							
Unemployed	-0.26	0.17	-.20	-1.57	.119	.27	3.73
Office worker	-0.14	0.18	-.08	-0.75	.455	.37	2.70
Self-employed	-0.11	0.17	-.07	-0.65	.515	.37	2.70
Others	-0.37	0.20	-.21	-1.83	.070	.31	3.20
Meals more than 210 g (Ref: less than 210 g)	0.12	0.10	.09	1.21	.229	.79	1.26
Meal count 3 times a day (Ref: less than 2 times a day)	0.18	0.12	.11	1.52	.132	.75	1.33
Self-reported ECOG-PS (Ref: 0)							
ECOG-PS-1	-0.09	0.10	-.07	-0.84	.400	.65	1.53
ECOG-PS-2	-0.04	0.15	-.02	-0.25	.800	.65	1.54
ECOG-PS-3	-0.19	0.21	-.07	-0.92	.362	.69	1.45
Hemoglobin	0.15	0.13	.09	1.22	.225	.72	1.39
Multiple cancers or recurrent cancer	-0.17	0.13	-.09	-1.31	.193	.93	1.08
Fatigue (score)	-0.32	0.05	-.47	-6.32	<.001	.74	1.35
Self-care behavior	0.09	0.04	.14	2.00	.048	.83	1.21
Durbin-Watson=1.93, R^2=.47, Adjusted R^2=.41, F=7.60, p<.001							

QoL = Quality of Life; ECOG-PS = Eastern Cooperative Oncology Group Performance Status; Ref.= reference; B= unstandardized coefficients; SE= standard error; β= standardized coefficients; VIF= variance inflation factor

ated with anemia improved, anxiety and depression scores in patients with cancer also improved, suggesting that anemia management might positively affect patients' emotional health. In this study, anemia levels were significantly associated with QoL, suggesting the need for comprehensive nursing interventions that extend beyond physical symptom management to include psychosocial domains in the fatigue management for patients undergoing chemotherapy. Curt[17] also supported these findings, emphasizing that in home settings, where assessment frequency is relatively low and specialized support for symptom management is limited, a proactive approach to fatigue prevention and enhanced self-management education is essential. Therefore, nurses should not only regularly assess patients' fatigue levels but also tailor and apply multidimensional, individualized nursing interventions to the home environment, including education, rest regulation, dietary advice, and recommendations for light exercise.[18]

Self-care behavior showed a significant positive correlation (*p* < .005) with QoL. In the multiple regression analysis, self-care behavior was identified as a significant variable that positively influenced QoL (β = .141, *p* = .048). This finding indicates that the more actively self-care behavior is performed, the higher the QoL.

These results align with previous findings.[19] Self-efficacy in self-care behavior was identified as the strongest predictor of QoL (*p* < .001). This suggests that self-care behavior enables individuals to manage various physical and emotional symptoms that arise during cancer treatment more effectively and to maintain a sense of control over daily life, thereby influencing their QoL. In this study, self-care behavior was found to be a significant variable affecting QoL (*p* = .048), indicating the need for educational development to enhance self-care behavior in the home environment for nurses, caregivers, and patients.

A study analyzing the QoL of patients undergoing home-

based chemotherapy with a disposable elastomeric infusion pump categorized into four domains revealed that among the physical, social/family, emotional, and functional factors, social/family status did not show significant results in terms of fatigue or self-care behavior. This result aligns with previous research.[20] This is consistent with previous studies that noted that the Edmonton Symptom Assessment System (ESAS) item "feeling of well-being" (ESAS-WB) reflects the FACT-G and physical well-being (PWB), emotional well-being (EWB), and functional well-being (FWB) domains, but is less sensitive to the social and family well-being (SWB) domain. In this study, responses to items associated with sexual life may have been limited for emotional reasons, which can influence the sensitivity of QoL assessment in the SWB domain.[21]

For patients receiving chemotherapy at home, improving self-care behavior is a key strategy for maintaining treatment adherence and QoL. However, in clinical practice, patients' ability to perform self-care behavior is often limited because of insufficient education, inconsistent information delivery, and psychological burdens. Therefore, nurses should develop step-by-step self-care behavior education materials tailored to the level of patients and their caregivers and establish a nursing intervention system that enables continuous feedback and motivation through a home care coordination platform.

Limitations of the study

This descriptive correlational study was conducted using a convenience sample from a single hospital and therefore has limitations in terms of generalizability owing to the heterogeneity of the sample based on cancer type, stage, and treatment modality. Additionally, the use of a self-report questionnaire may introduce subjective bias. Further longitudinal and qualitative studies are required to clarify the effects of home-based chemotherapy using a disposable elastomeric infusion pump on fatigue, self-care behavior, and QoL in patients over time.

CONCLUSION

This study empirically demonstrated the need to develop a fatigue assessment and intervention protocol for patients undergoing home-based cancer treatment, to establish practical strategies to enhance self-care abilities, and to expand community-based nursing practice. Particularly in public health crises such as the COVID-19 pandemic, in which contact with healthcare providers is often limited, self-care abilities play an increasingly critical role in enabling patients to manage their own health. Therefore, the findings of this study can serve as a foundation for developing a cancer care nursing model for patients receiving home-based chemotherapy with a disposable elastomeric infusion pump and for designing nursing education programs and patient education materials, thereby providing foundational clinical and policy-based data. This study suggests the use of community-based nursing to enhance self-care behavior among cancer outpatients and proposes home-based nursing as an important nursing strategy. From a policy perspective, this study provides evidence-based insights that support the development of sustainable, patient-centered home-based chemotherapy models that can be applied even during public health emergencies.

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