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The Significance of Light Triad in Terms of Spiritual Intelligence

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Abstract: The aim of the study is to determine the relationship between spiritual intelligence and light triad and the predictive power of spiritual intelligence and light triad and to reveal the importance of the light triad in terms of spiritual intelligence. Correlational method was used in the study. Participants were formed a convenient sampling method. The sample of the study consisted of 293 students (85% female, 15% male) studying at Sakarya University. Data were collected with the Spiritual Intelligence Characteristics' Scale and the Light Triad Scale. As a result of the Pearson Correlation Analysis, a positive significant relationship was found between spiritual intelligence and the light triad, except for the relationship between the ability to understand the spiritual/non-material aspect of life and faith in humanity, personal meaning production and humanism, and faith in humanity. Multiple regression analysis found that humanism significantly predicted both spiritual/spiritual understanding of life and awareness dimensions of spiritual intelligence, and Kantianism and faith in humanity sub-dimensions significantly predicted metaphysical awareness, and Kantianism significantly predicted entering high states of consciousness and awareness. The t-test result found that the dimensions of spiritual intelligence did not differ significantly according to gender. In generally, the relationship between spiritual intelligence and light triad was examined and light triad was found to predict spiritual intelligence. It was found that spiritual intelligence did not differ significantly according to gender. As a result, it can be said that intelligence and personality are related.

Keywords: Intelligence, Spiritual Intelligence, Personality, Light Triad

1. Introduction

Intelligence can be defined as the ability to use one's inherent talent. One of the types of intelligence that helps people to inquire about themselves existentially, to find meaning in their personal lives more easily, and to find solutions to their problems has been defined as spiritual intelligence (1,2). Although other types of intelligence include IQ, which emphasises cognitive abilities, or EQ, which emphasises emotions, people obtain meaning and awareness in their lives through spiritual intelligence (3). For this reason, it can be said that people need spiritual intelligence as well as intelligence for a more peaceful life.

Personality can be defined as a set of structures that distinguish it from others. The light triad includes the light side of humanity (4). The light triad consists of three sub-dimensions: Kantianism, humanism and faith in humanity. Kantianism is defined as seeing behavior as valuable for the behavior itself, not for a goal. Humanism emphasizes the uniqueness of human beings. Faith in humanity defines the belief that human beings are intrinsically good (4,5). As a result, it can be said that human beings are made up of many structures.

It can be said that personality is as complex as intelligence. Personality is associated with spiritual intelligence (6,7). Different personality structures in human beings appear in different ways in the field of spiritual intelligence (8). When the literature is examined, there has been related research on the relationship between spiritual intelligence and personality (9-14) and there are few studies on personality predicting spiritual intelligence (9-11,13) however, there is no study in the literature in

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which spiritual intelligence and the Light triad are examined together. Therefore, it was important to examine the relationship between the light triad and spiritual intelligence.

It can be said that the study on whether spiritual intelligence differs according to gender is important due to the existence of gains such as gaining meta-cognitive and cognitive awareness, providing meaning in life. In the literature, there have been several gender-related and non-gender-related studies on spiritual intelligence (1,7,13,15-33). This situation has caused confusion in the literature. For this reason, it is studied whether spiritual intelligence differs in terms of gender or not.

2. Method

In this study, correlational research method was used to be examined the relationship between spiritual intelligence and light triad. Correlational research method is a research method used to determine the statistical relationships between at least two variables. Convenient sampling method was used in the study. This is a sampling method that the researcher can easily reach from his/her environment (34).

Ethical approval was first obtained and then informed consent was obtained from the participants. Data were then collected face-to-face. Data were collected from 300 people studying at Sakarya University in the 2023-2024 academic year, but 7 extreme data were not included in the analysis. 293 data were analyzed. The ages of the participants ranged between 18-30 years ($\bar{x} = 20.47$), 85% were female and 15% were male.

Karadeniz and Aydın have developed Spiritual Intelligence Characteristics' Scale (2). It has 26 items and a 5-factor structure. There are factors of the ability to understand the spiritual/non-material aspect of life (8 items), the metaphysical awareness (6 items), entering into heightened states of consciousness and awareness (5 items), the awareness (4 items), and the personal meaning production (3 items). Items 24, 25 and 26 are negative items. The scale is using a 5-point Likert type (1= Strongly disagree, 5= Strongly agree). Cronbach Alpha reliability coefficient was .91.

The Light Triad Scale was developed by Kaufman et al. (4). The scale, originally in English, was adapted into Turkish by Tekeş and Bıçaksız (5). There are sub-dimensions of humanism (items 1-4), faith in humanity (items 5-8), and Kantianism (items 9- 12). The scale items are 5-point Likert type (1=strongly disagree, 5=strongly agree). In the three-factor structure (model) adapted to Turkish, the chi- square test $r(\chi^2(51) = 120.85, p < .001)$ and RMSEA value were found as .06 (90% CI [.05, .07]) as a result of confirmatory factor analysis.

3. Results

Pearson Product Moment Correlation Analysis was conducted to determine the relationship between factors of spiritual intelligence and humanism, faith in humanity and Kantianism. The findings are shown in Table 1.

Table 1. Findings on the Relationship Between Spiritual Intelligence and the Light Triad

	1	2	3	4	5	6	7	8
1: Ability to understand the spiritual/non-material aspect of life	1							
2: Metaphysical awareness	.326**	1						
3: Entering into heightened states of consciousness and awareness	.390**	.608**	1					
4: Awareness	.348**	.709**	.609**	1				
5: Personal meaning production	.150*	.247**	.195**	.333**	1			
6: Humanism	.214**	.214**	.136*	.271**	.097	1		
7: Faith in humanity	.084	.285**	.141*	.185**	-.018	.375**	1	
8: Kantianism	.190**	.236**	.195**	.170**	.122*	.223**	.239**	1

**. $p < .01$ *. $p < .05$

According to Pearson's r (35) when Table 1 is examined, a low correlation was found in general, but a moderate positive significant relationship was found between the ability to understand the spiritual/non-material aspect of life and humanism ($r = .326, p < .01$), and a low-level positive significant relationship was found between Kantianism ($r = .190, p < .01$). There was no relationship between the ability to understand the spiritual dimension of life and faith in humanity ($r = .084, p < .05$). A low-level positive significant relationship was found between metaphysical awareness and Kantianism ($r = .236, p < .01$), humanism ($r = .214, p < .01$) and faith in humanity ($r = .285, p < .01$). A low-level positive significant relationship was found between entering high states of consciousness and awareness and Kantianism ($r = .195, p < .01$), humanism ($r = .136, p < .05$) and faith in humanity ($r = .141, p < .05$). A low-level positive significant relationship was found between awareness and Kantianism ($r = .170, p < .01$), humanism ($r = .271, p < .01$) and faith in humanity ($r = .185, p < .01$). A low-level positive significant relationship was found between personal meaning production and Kantianism ($r = .122, p < .05$). There was no relationship between personal meaning production and humanism ($r = .097, p < .05$) and faith in humanity ($r = -.018, p < .05$). The hypothesized results of the regression analysis are shown in Table 2.

Table 2. Findings Related to Descriptive Statistics and Regression Analysis Hypotheses

Variables	N	Lowest	Highest	$\bar{x}$	ss	Skewness	Kurtosis
Ability to understand the spiritual/non-material aspect of life	293	8.00	40.00	31.18	5.71	-.601	.805
Metaphysical awareness	293	6.00	30.00	22.42	4.77	-.519	.444
Entering into heightened states of consciousness and awareness	293	5.00	25.00	18.80	3.61	-.771	1.778
Awareness	293	4.00	20.00	15.61	2.99	-.784	1.341
Personal meaning production	293	5.00	20.00	13.71	2.93	-.111	-.089
Humanism	293	5.00	20.00	15.13	2.34	-.748	1.661
Faith in humanity	293	4.00	20.00	13.02	3.33	.032	-.307
Kantianism	293	6.00	20.00	14.06	2.79	-.356	.234

Within the regression assumptions, it was examined whether there was a multicollinearity problem among the variables. As seen in Table 1, there is no multicollinearity problem among the independent variables. According to Mayers (35), skewness and kurtosis coefficients (± 3.29) and normality test criteria ($p > 0.05$ (sig.)) were analyzed. As a result of the examination of Table 2, it is seen that the regression assumptions are met. Accordingly, Multiple Regression Analysis was conducted for the predictive power of the humanism, faith in humanity, Kantianism and factors of spiritual intelligence. The findings obtained are shown in Table 3.

Table 3. Regression Analysis Results

Dependent Variable	Independent Variable	B	SH	B	t	p	VIF	Adjusted R ²
Model 1								
Ability to understand the spiritual/non-material aspect of life	Constant	20.329	2.458		8.270	.000		
	Kantianism	.315	.121	.154	2.600	.148	1.084	
	Humanism	.460	.151	.188	3.041	.003	1.199	.058
	Faith in humanity	-.041	.107	-.024	-.384	.702	1.084	
Model 2								
Metaphysical awareness	Constant	11.549	1.994		5.791	.000		
	Kantianism	.281	.098	.164	2.860	.005	1.084	
	Humanism	.201	.123	.099	1.641	.102	1.190	.110
	Faith in humanity	.298	.086	.208	3.446	.001	1.199	
Model 3								
Entering into heightened states of consciousness and awareness	Constant	13.147	1.565		8.402	.000		
	Kantianism	.208	.077	.161	2.701	.007	1.084	
	Humanism	.110	.096	.071	1.139	.256	1.190	.042
	Faith in humanity	.082	.068	.076	1.211	.227	1.199	
Model 4								
Awareness	Constant	8.932	1.269		7.039	.000		
	Kantianism	.110	.062	.103	1.756	.080	1.084	
	Humanism	.279	.078	.219	3.577	.000	1.190	.082
	Faith in humanity	.070	.055	.078	1.271	.205	1.199	
Model 5								
Personal meaning production	Constant	10.979	1.290		8.510	.000		
	Kantianism	.126	.064	.120	1.979	.049	1.084	
	Humanism	.129	.079	.103	1.621	.106	1.190	.016
	Faith in humanity	-.075	.056	-.085	-1.344	.180	1.199	

When Table 3 is examined, it is seen that the humanism ($\beta = .188, t = 3.041, p < .05$) significantly predicted the ability to understand the spiritual dimension of life. Kantianism ($\beta = .164, t = 2.860, p < .05$) and faith in humanity ($\beta = .208, t = 3.446, p < .05$) significantly predicted metaphysical awareness. Kantianism ($\beta = .161, t = 2.701, p < .05$) significantly predicts entering high states of consciousness and awareness. Humanism ($\beta = .219, t = 3.577, p < .05$) significantly predicted awareness. Kantianism ($\beta = .120, t = 1.979, p < .05$) significantly predicted personal meaning production. Whether spiritual intelligence differs according to gender is shown in Table 4.

Table 4. Findings Regarding Whether Spiritual Intelligence Factors Differ According to Gender

	Levene's Test		t-test			Group statistics			
	F	P	t	Df	p	Gender	N	$\bar{x}$	Ss
Ability to understand the spiritual/non-material aspect of life	.109	.742	.944	291	.346	Female	249	31.04	5.74
						Male	44	31.93	5.59
Metaphysical awareness	2.017	.157	-.779	291	.436	Female	249	31.04	5.74
						Male	44	31.93	5.59
Entering into heightened states of consciousness and awareness	.881	.349	.077	291	.938	Female	249	31.04	5.74
						Male	44	31.93	5.59
Awareness	.436	.510	-.813	291	.417	Female	249	31.04	5.74
						Male	44	31.93	5.59
Personal meaning production	4.030	.046	-.133	291	.895	Female	249	31.04	5.74
						Male	44	31.93	5.59

Levene's test was performed for the factors of spiritual intelligence; the ability to understand the spiritual/non-material aspect of life ($F = .109$, $p = .742$), metaphysical awareness ($F = 2.017$, $p = .157$), entering into heightened states of consciousness and awareness ($F = .881$, $p = .349$), awareness ($F = .436$, $p = .510$), personal meaning production ($F = 4.030$, $p = .046$) factors and Levene's test for gender and it was concluded that the data were homogeneously distributed. Then, independent samples t-test was used to examine whether factors of spiritual intelligence differed according to gender. The ability to understand the spiritual/non-material aspect of life ($t = .944$, $p > .05$), metaphysical awareness ($t = -.779$, $p > .05$), entering into heightened states of consciousness and awareness ($t = .077$, $p > .05$), awareness ($t = -.813$, $p > .05$) and personal meaning production ($t = -.133$, $p > .05$) did not differ significantly according to gender.

4. Discussion

A medium level significant relationship was found between the ability to understand the spiritual/non-material aspect of life and humanism, a low-level significant relationship was found between Kantianism, and no significant relationship was found between faith in humanity. A low-level positive significant relationship was found between the metaphysical awareness, entering into heightened states of consciousness and awareness, and awareness factors of spiritual intelligence and the Kantianism, humanism and faith in humanity. A low-level significant relationship was found between personal meaning production and Kantianism. No significant relationship was found between personal meaning production and humanism and faith in humanity. The light triad is based on Kantianism, which states that behavior itself is valuable, humanism, which states that human beings are unique, and faith in humanity, which states that human beings are basically good (4,5). The ability to make spiritual sense of life of life included the "spiritual meaning dimension"; therefore, there could not be a significant relationship between faith in humanity. Since the person has discovered that he/she and others are lovable and reflects this in his/her behavior, there could be a relationship between the ability to understand the spiritual/non-material aspect of life and Kantianism and humanism. It can be said that awareness of the universe and existence is metaphysically formed by "awareness". In addition, by being

conscious and aware, human beings could discovered the sub-dimensions of the triad of light. Therefore, it can be claimed that there is a relationship between high consciousness, entering states of awareness and awareness and the light triad. Personal meaning production (3) is characterized by the ability to make purpose and meaning in everyday life. Since meaning could be attributed to behaviors through personal meaning making, Kantianism could be related. In addition, religiosity and spirituality were found to be associated with the light triad (4). In the literature, there are studies examining the relationship between spiritual intelligence and personality (9-14). Therefore, it can be stated that the results are related to the literature.

It was found that the humanism significantly predicted the ability to understand the spiritual/non-material aspect of life, and the Kantianism and faith in humanity significantly predicted metaphysical awareness. The Kantianism significantly predicted entering high states of consciousness and awareness, and the humanism significantly predicted awareness. In addition, the Kantianism significantly predicted personal meaning production. It can be said that life can be perceived and made sense of more easily through the spiritual dimension. The humanism gives importance to the individual (4,5). Humanism may have been found to predict the ability to understand the spiritual/non-material aspect of life, as the individual may be more at peace with himself/herself as a result of providing spiritual meaning, and may also love himself/herself and others more easily. The discovery of the transcendent dimension is through metaphysical awareness (3). It can be said that the value of the essence of human beings and the importance of behaviors is discovered through the transcendental dimension; therefore, Kantianism and faith in humanity may have been found to significantly predict metaphysical awareness. It can be said that a high level of awareness is needed to comprehend the importance given to behavior, but awareness may be sufficient to discover that human beings are unique. Therefore, Kantianism may have been found to significantly predict entering high states of consciousness and awareness, and humanism may have been found to significantly predict awareness.

It was found that spiritual intelligence did not show a significant difference according to gender. There are studies showing similar findings in the literature (1,7,16,17,20,21,26,28,33). Due to the small number of samples, it can be said that men and women think similarly about dimensions of spiritual intelligence. In the literature, there are studies (15,19,23,25) in which mean scores were found to be higher in men. There are also findings showing that the mean scores are higher in women (13,18,22,24,27,29-32).

5. Conclusion and Suggestions

In this study, it was found that a positive significant relationship between spiritual intelligence and light triad (except for the relationship between the ability to understand the spiritual dimension of life and faith in humanity, personal meaning production and humanism, and faith in humanity). In other words, it can be stated that spiritual intelligence and personality are related as in the literature. Also, the Light triad was found to predict spiritual intelligence. In addition, it was found that spiritual intelligence did not differ significantly according to gender.

It has been noticed that there are few studies on spiritual intelligence in the literature. There is a need for more studies in the field of spiritual intelligence. As a result, depending on the effectiveness of intelligence and personality, various psycho-educational programs can be created.

Limitation

The limitations of the study include the limited number of university students and the lack of a balanced distribution in terms of gender.

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Investigation of the Effect of Nutrition Education on Nutrition Knowledge Level and Nutritional Habits

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Abstract:

Objective: Maintaining a balanced diet is essential for a healthy and quality life. A healthy diet considers an individual's age, gender, and physical condition and includes adequate amounts of all essential nutrients. University years mark a significant transition from childhood to adulthood, bringing about changes in lifestyle and behaviors, which can also influence attitudes and behaviors related to nutrition and health.

Methods: This study is planned to be conducted among 1st and 4th-year students enrolled in the 2024-2025 academic year in the Department of Nutrition and Dietetics at Faculty of Fethiye Health Sciences. Data collection will involve weight tracking, international physical activity questionnaire (IPAQ), a nutrition knowledge scale, a food consumption frequency record, and a personal information questionnaire, administered face-to-face.

Results: Among the participants, 28 were 1st-year and 45 were 4th-year nutrition and dietetics students. Significant differences were found between the 1st and 4th-year students' scores on the YETPİD (nutrition preference knowledge) and the nutrition knowledge level test ($p<0.05$). The 4th-year students had significantly higher YETPİD (basic nutrition) scores than the 1st-year students ($p<0.05$). Similarly, the 4th-year students scored significantly higher on the YETPİD (nutrition preference) compared to the 1st-year students. The nutrition knowledge test scores of 4th-year students were significantly higher than those of the 1st-year students ($p<0.05$). Additionally, there was a significant correlation between students' IPAQ scores and their YETPİD (basic nutrition) scores ($p<0.05$).

Conclusion: Based on the study findings, it appears that educational programs aimed at improving 1st and 4th-year students' knowledge of portion sizes and nutrition label interpretation not only enhance their knowledge levels but also positively impact their nutritional behaviors. Integrating practical applications into the curriculum alongside theoretical programming can significantly improve its overall quality.

Keywords: Education, Behavior, Students, Nutrients

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1. Introduction

Nutrition is defined as the intake of necessary nutrients in adequate amounts and at the right times to maintain health, prevent disease, and improve quality of life. Adequate and balanced nutrition has a protective effect, reducing health problems that arise from deficiencies in macronutrients and micronutrients (1). To develop healthy eating habits, individuals must possess sufficient nutritional knowledge. This knowledge is essential for making proper food choices and maintaining a healthy lifestyle. At this point, nutrition education serves as an important tool that increases knowledge and shapes attitudes and behaviors. The primary aim of nutrition education is to teach individuals about the relationship between nutrition and health, as well as which foods to consume and in what amounts (2).

The university period is a critical stage, characterized by the transition from adolescence to adulthood, during which significant lifestyle changes occur (3). During this period, eating habits that may continue

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throughout life begin to form. However, the university environment can negatively impact nutritional behaviors due to factors such as living away from family, making independent decisions, social influences, irregular lifestyles, economic constraints, and easy access to unhealthy food options (4). Academic workload, stress, irregular sleep patterns, and insufficient physical activity, in particular, create a foundation for the development of unhealthy eating habits. These habits often persist beyond the university years, contributing to chronic diseases such as obesity, hyperlipidemia, diabetes, and osteoporosis later in life (4,5).

In addition, unhealthy lifestyle behaviors, such as smoking, alcohol consumption, and insufficient physical activity, are commonly observed among university students (6). Therefore, universities are institutions that not only provide academic knowledge, but also shape health-related knowledge, attitudes, and behaviors within social environments. In this context, Nutrition and Dietetics students are particularly important. They receive an education in the science of nutrition, have opportunities to apply their theoretical knowledge to practice, and have the potential to model healthy lifestyles. The literature highlights that nutrition education increases nutritional knowledge levels, promotes healthy eating behaviors, and reduces unhealthy habits among university students (7,8). However, it has also been shown that, despite their knowledge, students may persist in unhealthy lifestyle behaviors. This indicates that the effects of nutrition education must be examined at both the knowledge and behavioral levels.

This study compared the nutritional knowledge, eating behaviors, and physical activity levels of first- and fourth-year students in the Department of Nutrition and Dietetics. Thus, the impact of nutrition education on students' lifestyles and eating behaviors was evaluated, demonstrating the educational process's contribution to acquiring healthy lifestyle habits. The following hypotheses were investigated for this purpose.

H0: There is no difference in nutritional behaviors between 1st- and 4th-year Nutrition and Dietetics students.

H1: There is a difference in nutritional behaviors between 1st- and 4th-year Nutrition and Dietetics students.

H2: There is a difference in physical activity levels between 1st- and 4th-year Nutrition and Dietetics students.

2. Methods

2.1. Study population

The descriptive study was conducted with 1st- and 4th-year volunteer students enrolled in the Nutrition and Dietetics Department of Faculty of Fethiye Health Sciences during the 2024–2025 academic year. Prior to the commencement of the study, the necessary permissions were obtained, and informed consent forms were collected from the participants. The target population included all registered students, totaling 78 individuals.

2.2. Inclusion and Exclusion Criteria

Students who were enrolled in the university, attending the 1st or 4th year during the 2024–2025 academic year, and voluntarily agreed to participate in the study were included. Students who had previously received undergraduate-level nutrition education were defined as exclusion criteria.

2.3. Ethical aspects of the research

Ethical approval for the study was obtained from the Muğla Sıtkı Koçman University Medical and Health Sciences Ethics Committee-2 (Sports and Health) (Decision No: 132, Date: 05.11.2024).

2.4. Surveys and scales

The data were collected using an online Google Forms survey method.

2.4.1. International Physical Activity Questionnaire (IPAQ)

The questionnaire was designed in 1996 by Dr. Micheál Booth (Sydney, Australia) to examine the health and physical activity levels of the population and the relationship between them. IPAQ was developed in both short and long forms to identify adults' physical activity and sedentary lifestyle patterns. In 1998–1999, reliability and validity studies of IPAQ were conducted using the test-retest method across 12 countries and 14 research centers on 6 continents (9). The reliability and validity study of both the short and long forms of the scale in Türkiye was conducted by Öztürk in 2005 (10). The IPAQ-Short Form used in this study consists of 4 sections and a total of 7 questions. The questionnaire is recommended for adults aged 18–69 years. The IPAQ scale is calculated by evaluating vigorous activities (e.g., basketball, football), moderate activities (e.g., folk dancing, bowling), walking, and sitting durations.

2.4.2. Food Frequency Questionnaire (FFQ)

The Food Frequency Questionnaire is a measurement tool used to determine how often and in what quantities individuals consume specific food groups or food items. Consumption frequency was assessed on a daily, weekly, or monthly basis. This method allows for the evaluation of dietary habits and is widely used to examine the relationship between diet and health or disease. The structure of the questionnaire can be adapted according to the researcher's objectives; foods can be listed individually or categorized (e.g., full-fat, semi-skimmed, fat-free). The FFQ used in this study included a total of 18 food items. The food groups were divided into six categories: dairy products, meat-eggs-legumes, fruits and vegetables, cereals, fats and sweets, and beverages. Participants were asked how frequently they consumed each food item (e.g., 1–2 times per day, 1–3 times per week, 4–6 times per week, once every 15 days, once a month, never), and daily energy and nutrient intake were calculated based on these responses (11).

2.4.3. Nutrition Knowledge Level for Adults (YETBİD)

The first section of the scale consists of 20 statements on a 5-point Likert scale assessing participants' basic nutrition knowledge and the relationship between diet and health, followed by a Visual Analog Scale (VAS) evaluating the diet-health relationship. The second section includes 12 statements on a 5-point Likert scale assessing participants' food preferences, followed by a VAS measuring the accuracy of these preferences. Participants responded to the 20 statements under "Basic Nutrition and Diet-Health Relationship" and the 12 statements under "Food Preference" using the options: strongly agree, agree, neither agree nor disagree, disagree, and strongly disagree. Scoring for correct statements was as follows: strongly agree = 4, agree = 3, neither agree nor disagree = 2, disagree = 1, strongly disagree = 0. For incorrect statements, scoring was reversed: strongly agree = 0, agree = 1, neither agree nor disagree = 2, disagree = 3, strongly disagree = 4. Additionally, participants evaluated the relationship between diet and health and the accuracy of their daily food choices using separate VASs ranging from 0 to 10 (12).

2.4. Analysis

Statistical analyses of the data obtained from the study were performed using the IBM SPSS 26.0 software package. Descriptive statistics such as frequency (n), percentage (%), mean ($\bar{X}$), and standard deviation (SD) were used to evaluate the data. For statistical comparisons, the following tests were applied: Parametric tests: Independent t-test, ANOVA, and Pearson correlation, Non-parametric tests: Mann-Whitney U test, Kruskal-Wallis test, Spearman correlation, and Chi-square test, Correlation

analyses were performed to examine relationships between variables, with Pearson or Spearman correlation coefficients calculated depending on normality assumptions.

3. Results

Among the participants, 5.47% were male, and 94.53% were female. The number of students who reported regular alcohol consumption increased from 10 in the 1st year to 18 in the 4th year. Similarly, the number of students engaging in regular physical activity rose from 28 in the 1st year to 45 in the 4th year (Table 1).

Table 1. Demographic Characteristics of the Groups

Variable		Class	
		1st Class N/(%)	4th Class N/(%)
Gender	Male	1(3.6)	3(6.7)
	Female	27(96.4)	42(93.3)
	Total	28(100)	45(100)
Alcohol consumption	Yes	10(35.7)	18(40)
	No	18(64.3)	27(60)
	Total	28(100)	45(100)
Smoking	Yes	4(14.3)	20(44.4)
	No	24(85.7)	25(55.6)
	Total	28(100)	45(100)
Hookah using	Yes	3(10.7)	2(4.4)
	No	25(89.3)	43(95.6)
	Total	28(100)	45(100)
Doing regular exercise	Yes	4(14.3)	2(4.4)
	No	24(85.7)	43(95.6)
	Total	28(100)	45(100)

Table 2 provides information on the dietary behaviors of the groups. First-grade students identified breakfast as the most important meal of the day, while fourth-grade students ranked breakfast as the most important, followed by dinner. In terms of snacks, 67.9% of first-grade students and 64.4% of fourth-grade students reported preferring fruit. The most common number of meals consumed daily among first-grade students was two, followed by three meals. Similarly, fourth-grade students also most commonly consumed two meals, followed by three meals.

A total of 96.4% of first-grade students and 95.6% of fourth-grade students reported having at least one snack during the day. Regarding meal types, 71.4% of first-grade students reported consuming home-cooked meals, while 29.6% reported consuming fast food. Among fourth-grade students, 93.3% reported consuming home-cooked meals, and 6.7% consumed fast food.

Additionally, 42.9% of first-grade students and 33.3% of fourth-grade students stated that they did not pay attention to the calorie content of meals. Finally, 46.4% of first-grade students and 28.9% of fourth-grade students reported adding salt to their meals without tasting them first.

Table 2. Information on the Nutritional Behaviors of the Groups

	Class	Meal	N/(%)
The most important meal	1 st Class	Breakfast	21(75)
		Lunch	4(14.3)
		Dinner	3(10.7)
		Total	28(100)
	4 th Class	Breakfast	27(60)
		Lunch	2(4.4)
		Dinner	15(33.3)
		Snack	1(2.2)
		Total	45(100)
Food preferred as a snack	1 st Class	Fruit	19(67.9)
		Milk/Yoghurt	4(14.3)
		Cheese	1(3.6)
		Biscuits	4(14.3)
		Total	28(100)
	4 th Class	Fruit	29(64.4)
		Milk/Yoghurt	1(2.2)
		Cheese	10(22.2)
		Biscuits	5(11.1)
		Total	45(100)
Number of daily meals [main meal]	1 st Class	1	2(7.1)
		2	18(64.3)
		3	8(28.6)
		Total	28(100)
	4 th Class	1	4(8.9)
		2	27(60)
		3	14(31.1)
		Total	45(100)
Number of daily meals [snack]	1 st Class	1	15(53.3)
		2	8(28.6)
		3	3(10.7)
		Total	1(3.6)
	4 th Class	1	1(3.6)
		2	28(100)
		3	12(26.7)
		4	21(46.7)
		I don't	4(8.9)
		Total	2(4.4)
	1 st Class	1	6(13.3)
		2	45(100)
		3	20(71.4)
		4	8(29.6)
Food consumed at meals	1 st Class	I don't	28(100)
		Total	42(93.3)
		Homemade food	3(6.6)
	4 th Class	Fast food	45(100)
		Total	3(10.7)
		Homemade food	12(42.9)
Pay attention to the calories of meals	1 st Class	Fast food	13(46.4)
		Total	28(100)
		Yes	7(15.6)
		No	15(33.3)
	4 th Class	Sometimes	23(51.1)
		Total	45(100)

Table 2 (Continued)

Add additional salt without tasting	1 st Class	Yes	15(53.6)
		No	10(35.7)
		Sometimes	3(10.7)
		Total	28(100)
	4 th Class	Never	32(71.1)
		Sometimes	12(26.7)
		Frequently	1(2.2)
		Total	45(100)

Table 3 shows the nutrition knowledge level scores of the groups. A significant difference was observed between the groups in terms of YETPİD (basic nutrition), YETPİD (food preference), and nutrition knowledge level test scores ($p < 0.05$). Fourth-grade students had significantly higher YETPİD (basic nutrition) scores compared to first-grade students ($p < 0.05$). Similarly, the YETPİD (food preference) scores of fourth-grade students were significantly higher than those of first-grade students. Additionally, the nutrition knowledge level test scores of fourth-grade students were significantly higher than those of first-grade students ($p < 0.05$).

Table 3. Nutrition Knowledge Level Scores

	Class	Number of Meals	IPAQ				Fisher- Freeman- HaltonExact Test
			Inactive (category 1)	Minimally active (category 2)	Very active (category 3)	Total	
			N/(%)				
Main Meal	1 st Class	1	1(5.3)	1(11.1)	0(0)	2(7.1)	1
		2	12(63.2)	6(66.7)	0(0)	18(64.3)	
		3	6(31.6)	2(22.2)	0(0)	8(28.6)	
		Total	19	9	0(0)	28(100)	
	4 th Class	1	0(0)	4(18.2)	0(0)	4(8.9)	0.225
		2	13(76.5)	10(45.5)	4(66.7)	27(60)	
		3	4(23.5)	8(36.4)	2(33.3)	14(31.1)	
		Total	17	22	6	45(100)	
Snack	1 st Class	1	9(47.4)	6(66.7)	0(0)	15(53.6)	0.825
		2	5(26.3)	3(33.3)	0(0)	8(28.6)	
		3	3(15.8)	0(0)	0(0)	3(10.7)	
		4	1(5.3)	0(0)	0(0)	1(3.6)	
		Don't have snack	1(5.3)	0(0)	0(0)	1(3.6)	
		Total	19	9	0	28(100)	
	4 th Class	1	4(23.5)	6(27.3)	2(33.3)	12(26.7)	0.536
		2	7(41.2)	12(54.5)	2(33.3)	21(46.7)	
		3	2(11.8)	2(9.1)	0(0)	4(8.9)	
		4	0(0)	1(4.5)	1(16.7)	2(4.4)	
		Don't have snack	4(23.5)	1(4.5)	1(16.7)	6(13.3)	
		Total	17	22	6	45(100)	

Table 3 (Continued)

Basic Food	1 st Class	Poor (<45)	12	4	0	16	0.531
		Fair (45-55)	4	3	0	7	
		Good (56-65)	3	1	0	4	
		Very good (>65)	0	1	0	1	
		Total	19	9	0	28	
	4 th Class	Poor (<45)	1	1	0	2	0.049
		Fair (45-55)	12	9	0	21	
		Good (56-65)	4	9	4	17	
		Very good (>65)	0	3	2	5	
		Total	17	22	6	45	
Food Preference	1 st Class	Poor (<30)	11	6	0	17	0.72
		Average (30-36)	6	3	0	9	
		Good (37-42)	2	0	0	2	
		Very good (>42)	0	0	0	0	
		Total	19	9	0	28	
	4 th Class	Poor (<30)	8	13	1	22	0.221
		Average (30-36)	6	5	2	13	
		Good (37-42)	2	2	3	7	
		Very good (>42)	1	2	0	3	
		Total	17	22	6	45	

Table 4 presents the comparison of students' meal frequency, YETPİD scores, and IPAQ values. No significant difference was found between students' IPAQ scores and the number of meals consumed ($p>0.05$). All highly active students were observed to consume 2 or 3 main meals per day. The majority of minimally active and inactive students reported consuming 2 main meals per day. Among highly active students, 83.3% reported having at least one snack during the day. Similarly, the majority of minimally active and inactive students also reported consuming at least one snack daily. A significant difference was found between students' IPAQ scores and YETPİD (basic nutrition) scores ($p<0.05$). Among highly active students, 33.33% had an excellent level of basic nutrition knowledge, and 66.67% had a good level. In contrast, 86.11% of inactive students had moderate or low scores in basic nutrition knowledge. Similarly, 50% of highly active students had good food preference scores, while the

remaining 50% had moderate or poor scores. The majority of minimally active and inactive students had moderate or poor food preference scores.

Table 4. Comparison of IPAQ Values with Number of Meals and YETPİD Scores

	Class	Number of Meals	IPAQ				Fisher- Freeman- HaltonExact Test
			Inactive (category 1)	Minimally active (category 2)	Very active (category 3)	Total	
			N/(%)				
Main Meal	1 st Class	1	1(5.3)	1(11.1)	0(0)	2(7.1)	1
		2	12(63.2)	6(66.7)	0(0)	18(64.3)	
		3	6(31.6)	2(22.2)	0(0)	8(28.6)	
		Total	19	9	0(0)	28(100)	
	4 th Class	1	0(0)	4(18.2)	0(0)	4(8.9)	0.225
		2	13(76.5)	10(45.5)	4(66.7)	27(60)	
		3	4(23.5)	8(36.4)	2(33.3)	14(31.1)	
		Total	17	22	6	45(100)	
Snack	1 st Class	1	9(47.4)	6(66.7)	0(0)	15(53.6)	0.825
		2	5(26.3)	3(33.3)	0(0)	8(28.6)	
		3	3(15.8)	0(0)	0(0)	3(10.7)	
		4	1(5.3)	0(0)	0(0)	1(3.6)	
		Don't have snack	1(5.3)	0(0)	0(0)	1(3.6)	
		Total	19	9	0	28(100)	
	4 th Class	1	4(23.5)	6(27.3)	2(33.3)	12(26.7)	0.536
		2	7(41.2)	12(54.5)	2(33.3)	21(46.7)	
		3	2(11.8)	2(9.1)	0(0)	4(8.9)	
		4	0(0)	1(4.5)	1(16.7)	2(4.4)	
		Don't have snack	4(23.5)	1(4.5)	1(16.7)	6(13.3)	
		Total	17	22	6	45(100)	
Basic Food	1 st Class	Poor (<45)	12	4	0	16	0.531
		Fair (45- 55)	4	3	0	7	
		Good (56-65)	3	1	0	4	
		Very good (>65)	0	1	0	1	
		Total	19	9	0	28	
	4 th Class	Poor (<45)	1	1	0	2	0.049
		Fair (45- 55)	12	9	0	21	
		Good (56-65)	4	9	4	17	
		Very good (>65)	0	3	2	5	
		Total	17	22	6	45	

Table 4 (Continued)

Food Preference	1 st Class	Poor (<30)	11	6	0	17	0.72
		Average (30-36)	6	3	0	9	
		Good (37-42)	2	0	0	2	
		Very good (>42)	0	0	0	0	
		Total	19	9	0	28	
	4 th Class	Poor (<30)	8	13	1	22	0.221
		Average (30-36)	6	5	2	13	
		Good (37-42)	2	2	3	7	
		Very good (>42)	1	2	0	3	
		Total	17	22	6	45	

4. Discussion

This study was conducted to compare the effects of nutrition education on diet quality, nutritional knowledge level, and healthy eating behaviors among university students who have received nutrition education versus those who have not.

4.1. Nutrition knowledge level

In our study, fourth-year students scored significantly higher than first-year students in both basic nutrition and food preference knowledge. This finding suggests that the theoretical and practical courses offered during the latter stages of an undergraduate program contribute to students' knowledge accumulation. Similarly, Çakır et al. (2018) and Demirezen & Coşansu (2005) found that senior health sciences students had significantly higher nutrition knowledge scores than lower-year students (13,14). International studies have also emphasized that nutrition education improves students' knowledge levels and increases awareness of healthy eating in higher grades (15).

4.2. Meal patterns and breakfast habits

In our study, first- and fourth-year students identified breakfast as the most important meal; however, fourth-year students placed greater emphasis on dinner. This suggests that students' awareness of daily energy balance may change with education. Skipping breakfast has been associated with impaired cognitive performance and lower academic achievement in the literature (16,17). Conversely, some studies have shown that university students often skip breakfast and have irregular eating habits (18). The fact that students in our study considered breakfast the most important meal supports the role of nutrition education in raising awareness.

4.3. Snack preferences

In our study, both groups predominantly preferred fruit as a snack. This finding aligns with studies indicating that healthy snack choices are prevalent among university students (19). However, fourth-year students consumed more dairy products and cheese for protein, suggesting that education can expand the variety of snacks chosen. Similarly, Sogari et al. (2018) found that nutrition education encourages students to choose healthier alternatives to fast food (20).

4.4. Home-cooked meals and fast-food consumption

Our results showed that fourth-year students consumed home-cooked meals more frequently and fast food less frequently than first-year students did. This indicates that education promotes healthier eating behaviors. Özdoğan and Özçelik (2011) also found that, although fast food consumption is common among university students, those who receive nutrition education are less likely to consume such foods. Furthermore, the literature widely reports that fast-food consumption is associated with obesity and chronic diseases (21). This may be due to the continuation of nutrition and changes in food preferences.

4.5. Salt consumption habits

In our study, a significant proportion of first-year students reported adding salt to their meals without tasting them first. This behavior was markedly reduced among fourth-year students. This finding demonstrates that education increases awareness of healthy salt consumption habits. In Turkey, salt intake generally exceeds recommended levels, posing a risk for hypertension and other chronic diseases (22). Our results suggest that nutrition education positively contributes to reducing salt intake.

4.6. Physical activity and smoking/alcohol use

In our study, the rate of regular exercise increased among fourth-year students; however, the prevalence of smoking also increased. This may be associated with increased academic stress, the social environment, and independent living conditions during the university years. The World Health Organization (2019) has also reported that tobacco use is a widespread public health problem among young adults. Similarly, studies conducted in Türkiye have shown that smoking rates among health sciences students can exceed expectations (23,24). These findings suggest that nutrition education alone is insufficient and that comprehensive programs promoting healthy lifestyles are necessary.

5. Conclusion and Recommendations

Based on the findings of the research, it has been observed that 4th-year students have a higher level of knowledge regarding portion sizes and interpreting food labels compared to 1st-year students. It was also found that nutrition and dietetics education not only increases students' nutritional knowledge levels but also leads to positive changes in their nutritional behaviors. Students who have achieved behavior change can contribute to establishing a more effective patient-dietitian relationship during their post-graduation field experience.

The study is limited in that the findings, based on students from the Department of Nutrition and Dietetics, cannot be generalized to students from other faculties or to the broader university population. Additionally, if the study was conducted at a single university or within a limited time frame, the results may vary in different periods or at different universities.

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Management of Endometriosis: Symptoms, Treatments, Self-Care Practices, and the Role of Nurses

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Abstract: Endometriosis is a benign chronic disease characterized by the ectopic implantation and growth of endometrial tissue, which is normally confined to the uterine cavity. This disease frequently causes pain symptoms such as dysmenorrhea, pelvic pain, dyspareunia, dyspareunia, dysuria, dyskinesia and infertility and negatively affects the quality of life of women. In this context, pharmacologic and/or surgical treatment is applied as medical intervention in order to reduce the symptoms of endometriosis and improve quality of life. Due to the non-curative nature of medical treatments and the risk of recurrence following surgical interventions, current treatment options do not offer a complete cure for endometriosis. Therefore, women may adopt self-care practices in addition to standard treatments as part of endometriosis management. When these practices are carried out under the control of healthcare team, they can contribute positively to the management of the disease. One of the key members of the healthcare team is the endometriosis nurse, who plays a prominent role through responsibilities in caregiving, education, counseling, communication, and coordination. In this review, symptoms, treatment, self-care practices and the role of the nurse in endometriosis were discussed.

Keywords: Endometriosis, Nurses, Self-Care, Treatment

1. Introduction

Endometriosis is a benign chronic disease characterized by the ectopic implantation and growth of endometrial tissue, which is normally confined to the uterine cavity (1,2). It is estimated that approximately 10% (190 million) of women of reproductive age worldwide are affected by endometriosis (1,3). In an epidemiologic study conducted in Turkey, 18.3% of women were reported to have endometriosis (4). The etiology of endometriosis, which is quite common, is still unknown. Some studies have reported an increased risk of endometriosis in women with a history of endometriosis in a first-degree relative, prolonged exposure to endogenous estrogen, short menstrual cycles (<27 days), a history of infertility and risky lifestyle behaviors (such as unhealthy diet and lack of regular exercise) (5-9).

Endometriosis, a multifactorial disease, frequently leads to symptoms such as pain (dysmenorrhea, pelvic pain, dyspareunia, dysuria, dyschezia) and infertility, thereby negatively impacting women's quality of life. (10). In this context, medical interventions including pharmacological (analgesic and hormonal therapy) and/or surgical treatments are employed to alleviate endometriosis symptoms and improve quality of life (1). However, despite these treatments, many women continue to experience pain. Moreover, pharmacological therapies may cause side effects, leading 10–40% of women to discontinue treatment. Surgical interventions, on the other hand, carry the risk of complications and disease recurrence following the procedure. Due to these factors, women often turn to self-care practices in addition to treatments to manage their symptoms (11,12).

In this review, symptoms, treatment, self-care practices and the role of the nurse in endometriosis were discussed.

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2. Symptoms

Endometriosis is often associated with pain symptoms (dysmenorrhea, pelvic pain, dyspareunia, dysuria, dyskinesia) and infertility (1,13). In addition to pain and infertility, gastrointestinal symptoms such as nausea, hypoglycemia, diarrhea, constipation, hematochezia and hematuria; menstrual symptoms such as menorrhagia and metrorrhagia; and psychosomatic symptoms such as dizziness, fatigue, stress, depression and anxiety may be observed depending on the location of endometriosis foci. These symptoms may occur alone or in combination with other symptoms. An increase in the number of symptoms is associated with an increased likelihood of endometriosis. However, endometriosis can also be asymptomatic in some cases (1,6,8,9,13,14).

3. Treatment

There is no definitive treatment for endometriosis. However, treatment methods including pharmacological, surgical or a combination of both are applied to reduce pain, preserve fertility and improve quality of life (1,8).

3.1. Pharmacological treatment

3.1.1. Analgesics

The National Institute for Health and Care Excellence recommends paracetamol or non-steroidal anti-inflammatory drugs (NSAIDs), alone or in combination, as first-line treatment for endometriosis-related pain. However, continuous intake of NSAIDs throughout the menstrual cycle may prevent ovulation (13,15). Therefore, it is recommended that NSAIDs should not be used in women who have difficulty conceiving or are infertile (16).

3.1.2. Hormonal treatment

Hormonal treatment may include combined hormonal contraceptives (CHC), progestogens, Gonadotropin-Releasing Hormone (GnRH) analogs and aromatase inhibitors. Among these methods, CHC inhibits ovulation by suppressing gonadotropin hormones (Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH)). It also creates a hypoestrogenic environment, causing initial decidualization and subsequent atrophy of endometrial tissue (8,13). HRC is available in combined oral contraceptive (COC), patch and vaginal ring forms. International guidelines recommend the use of COC in the first line of hormonal therapy (16).

Progestogens are another commonly used hormonal treatment modality for endometriosis, following the use of CHC, and have apoptotic, antiangiogenic and immunomodulatory effects in addition to the effects of CHC. Progestogens are available in oral contraceptive, levonorgestrel-releasing intrauterine device and implant forms. Side effects such as irregular uterine bleeding/staining, amenorrhea, weight gain, and mood changes may be observed with the use of these progestogen forms (8,13,16).

GnRH analogs can be used instead of these treatment modalities in cases where the use of the CHC and progestin therapy is not effective. GnRH analogs are divided into two groups: agonists and antagonists. GnRH agonists initially bind to the GnRH receptors in the pituitary gland and induce a response that increases gonadotropins, but then desensitize the pituitary to stimulation by causing the receptors to decrease. Thus, it creates a hypogonadotropic-hypogonadal state (medical hypophysectomy and oophorectomy). GnRH agonists can be administered intramuscularly, subcutaneously or intranasally. Side effects associated with the use of GnRH agonists include hot flushes, vaginal dryness, decreased libido, mood swings, headaches and decreased bone density. GnRH antagonists suppress gonadotropin hormones and consequently sex steroids. GnRH antagonists are administered orally or intramuscularly (8). Side effects such as vaginal atrophy and bone loss can be seen with the use of GnRH antagonists (8,13,16).

Aromatase inhibitors suppress estrogen synthesis both in the periphery (brain, adipose tissue) and in endometriotic foci. Aromatase inhibitors have side effects such as vaginal dryness, hot flushes and decreased bone mineral density. Therefore, they are recommended when other pharmacologic treatment methods and surgical treatment are not effective (8,13,16).

3.2. Surgical treatment

The main goal of surgical treatment is to excise all visible endometriotic foci and to prevent or delay recurrences. This treatment is preferred in cases where malignancy is suspected, intestinal and urinary tract obstruction is present, pharmacologic treatment is ineffective, contraindicated or refused by the patient. Surgical treatment is divided into conservative and radical. Conservative surgery involves excision or ablation of endometriotic foci to preserve the uterus and ovarian tissue. This treatment is the first choice in the surgical treatment of endometriosis because it preserves fertility, is less invasive than radical surgery and carries a lower risk of morbidity. However, in addition to the standard surgical risks, there are complications, especially the risk of bowel and bladder injury, decreased ovarian reserve (e.g. after endometrioma excision) and postoperative adhesion formation (17).

Radical surgery includes hysterectomy with or without oophorectomy. This method is preferred in women who have no desire to have children and have not responded to previous medical or conservative surgical treatments. However, it has complications such as permanent loss of fertility and increased symptoms related to surgical menopause (17).

4. Self-Care Practices

Self-care is the ability of individuals, families, and communities to promote and maintain health, prevent disease, and cope with illness, with or without the support of healthcare professionals (18). Self-care in endometriosis is the practices women engage in on their own to manage disease symptoms and treatment-induced complications (19,20). When these practices are carried out under the control of health professionals, they can contribute positively to the management of the disease (19). Farshi et al. study, it was reported that self-care counseling decreased anxiety levels and improved the quality of life of women with endometriosis (21). In Joseph and Mills' study, it was determined that the multidisciplinary pain self-management program applied to women living with endometriosis-related/non-associated pelvic pain increased women's pain self-management skills and quality of life. (22). Šakinytė and Šakalytė's study found that self-care, when properly directed, was effective in reducing endometriosis symptoms and complications caused by the disease (19). In line with the existing studies, it is seen that self-care is very important in the management of endometriosis. In this context, the following self-care practices can be recommended by evaluating women with endometriosis under the control of health professionals (19,21,23-28).

Some suggestions for self-care practices;

- Regular monitoring of symptoms,
- Seek specialist support in case of increased symptoms or infertility,
- Regular use of prescribed medicines,
- Regular health check-ups,
- Eating a healthy diet, especially adopting an anti-inflammatory diet, including:
 - Consumption of fibrous foods,
 - Preference for red fruits and green leafy vegetables,
 - Consuming foods containing omega-3,
 - Limit sugar and refined carbohydrates,

- Reduction of products containing caffeine,
 - Restricting consumption of processed and red meat,
 - Reducing or stopping alcohol consumption,
 - Avoiding prepared and packaged foods,
 - Prefer vegetable oils (olive oil),
- Regular low to moderate intensity exercise (walking, swimming, yoga),
 - Applying methods of coping with stress (such as meditation, deep breathing exercises, spiritual support),
 - Seek social or professional support where necessary,
 - Rest and warm application in cases of pain,
 - Requesting support when daily tasks are difficult,
 - Sleep 7-9 hours a day,
 - Maintaining participation in social activities.

5. The Role of the Nurse

Multidisciplinary care is recommended in addition to standard treatment in the management of endometriosis (29). Multidisciplinary care is a team approach that brings together the competencies of specialists from different disciplines to provide long-term, comprehensive and patient-centered care for endometriosis patients (30). One of the key members of the team is the endometriosis nurse (31). Endometriosis nurses come to the forefront with their caregiving, education, counseling, communication and coordinator roles (32,33). In the role of the caregiver, they should take the patient's anamnesis, perform a physical examination, guide symptom management, pain control, follow-up of medication and development of self-care strategies. They should also conduct regular follow-up interviews with the patient to monitor the course of the disease and response to treatment (33,34). In the role of the educator, they should educate health professionals, women and their partners about endometriosis and develop materials to be used in trainings (33,35). In the role of the counseling, they should provide counseling for pain, infertility, diagnosis and treatment process, menopause, sexuality and psychological problems or refer them to relevant specialists (33,34). In the role of the communication and coordinator, they should ensure that care is carried out in a holistic manner by communicating effectively with other members of the multidisciplinary team such as gynecologists, general practitioners, algologists, physiotherapists and psychologists. In addition, they should contribute to the monitoring and continuity of service quality by taking an active role in the planning, implementation and evaluation of care. They should also coordinate organizational processes such as managing databases, arranging outpatient appointments and planning surgical interventions (31,33). With these roles, nurses can raise awareness about endometriosis, reduce symptoms, improve self-care behaviors and quality of life (36-39).

6. Conclusion

Endometriosis frequently leads to symptoms such as pain and infertility, adversely affecting women's quality of life. Pharmacological and surgical treatments are employed to manage these symptoms and enhance quality of life. In addition to treatments, many women also adopt self-care practices. When performed under the supervision of nurses and other healthcare professionals, self-care practices can be effective in reducing pain, anxiety, and disease-related complications, as well as in improving quality of life. However, the existing literature on this topic is limited, and further high-quality research is needed to strengthen the evidence base.

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The Role of Liposomal Delivery Systems in the Treatment of Triple Negative Breast Cancer

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Abstract: This study aims to highlight the potential of liposomal nanocarrier systems in addressing the challenges associated with the treatment of triple-negative breast cancer (TNBC) and to provide a literature-based foundation for their use in targeted therapeutic approaches. This study evaluating the efficacy of liposomal drug delivery systems in TNBC treatment, along with current developments reported in the literature. Particular emphasis is placed on surface modifications involving PEGylation, antibodies, aptamers, and small molecules, and their impact on therapeutic success. TNBC accounts for approximately 20% of all breast cancer cases and represents a highly aggressive subtype characterized by treatment resistance and high metastatic potential. Conventional treatment methods often fall short, with recurrence observed in about 40% of cases and mortality reaching 80–90% due to therapy-resistant tumors. Liposomes have garnered attention due to their ability to enhance drug bioavailability, reduce systemic toxicity, and provide tumor site-specific targeting. Numerous formulations have been developed, ranging from PEGylated liposomes to antibody- and aptamer-conjugated systems, demonstrating therapeutic efficacy in various TNBC cell lines and animal models. Given the aggressive nature of TNBC and the limited treatment options, liposomal nanocarrier systems offer a promising alternative. The integration of these systems with specific targeting modifications may lay the groundwork for future personalized and more effective TNBC therapies. To facilitate clinical translation, it is essential to establish standardized production protocols, streamline regulatory processes, and strengthen interdisciplinary collaborations.

Keywords: Triple-Negative Breast Cancer, Liposome, Targeted Therapy, Drug Delivery Systems, Nanotechnology

1. Introduction

Breast cancer is the most common type of cancer in women today. The World Health Organization's Agency for Research on Cancer (IARC) reported that 1 in 20 women will be diagnosed with breast cancer in their lifetime, and if current rates continue, there will be 3.2 million new cases of breast cancer and 1.1 million breast cancer-related deaths annually by 2050 (1). TNBC (Triple-Negative Breast Cancer) is one of the most aggressive and difficult to treat types of breast cancer. This type of breast cancer is characterized by reduced/absent expression of estrogen (ER), progesterone (PR) and human epidermal growth factor receptor 2 (HER2). Current treatment options for TNBC vary depending on the specific subtype and stage of the tumor and include surgical interventions as well as conventional treatments such as adjuvant (postoperative) or neoadjuvant (preoperative) chemotherapy, radiotherapy and immunotherapy (2,3). However, approximately 40% of TNBC tumors relapse and the development of drug resistance and metastatic features results in death in 80-90% of patients (4,5). The lack of universally applicable specific molecular targets in TNBC treatment further increases the risk of death (6,7). Considering the current treatment challenge in TNBC, the development of nanocarrier-based drug delivery systems as an alternative to conventional cancer therapies is of great importance. One of the most widely used of these systems is liposomes (8,9).

In this review, the mechanisms and interactions of signaling pathways that constitute the molecular basis of TNBC and the conventional treatment of TNBC and the structural properties, production techniques, drug encapsulation methods and therapeutic treatment potentials of liposomes, which are the next generation drug delivery systems, will be discussed comprehensively.

1.1. Triple Negative Breast Cancer (TNBC)

Triple negative breast cancer (TNBC) is one of the most difficult subtypes of breast cancer to treat, characterized by the absence of estrogen receptor (ER), progesterone receptor (PR) and human epidermal growth factor receptor 2 (HER2) expression. The lack of response to hormonal or HER2-targeted therapies poses serious limitations to the systemic treatment of this tumor type. TNBC accounts for approximately 15-20% of all breast cancers and is associated with high recurrence rates, a tendency for early metastasis and poor prognosis (10). Therefore, chemotherapy is often used as the main treatment approach in TNBC patients. However, targeted therapies such as immune checkpoint inhibitors and poly (ADP-ribose) polymerase (PARP) inhibitors have shown promise, especially in patients carrying BRCA1/2 mutations (4).

The fact that TNBC has a highly heterogeneous structure at the molecular level necessitated the identification of different subtypes and accordingly, six basic molecular subtypes were defined according to gene expression profile: Basal-like 1 (BL1), Basal-like 2 (BL2), Immunomodulatory (IM), Mesenchymal (M), Mesenchymal Stem Cell-like (MSL) and Luminal Androgen Receptor (LAR) (11). The BL1 subtype is characterized by high expression of genes sensitive to DNA repair mechanisms (e.g. BRCA1, TP53) and responds well to platinum-based chemotherapy or PARP inhibitors (12-14). In the BL2 subtype, growth factor signaling pathways and metabolic processes predominate; EGFR inhibitors and metabolic-targeted agents are potential treatment options in this subtype (13). In the pathogenesis of triple negative breast cancer (TNBC), key pathways such as EGFR, AR, Notch, Wnt/ β -catenin, Hedgehog (Hh) and TGF- β regulate processes such as cell proliferation, invasion, survival and metastasis (Figure 1). Dysregulation of these pathways promotes aggressive tumor behaviors, increases resistance to therapy and offers potential targets for targeted therapies.

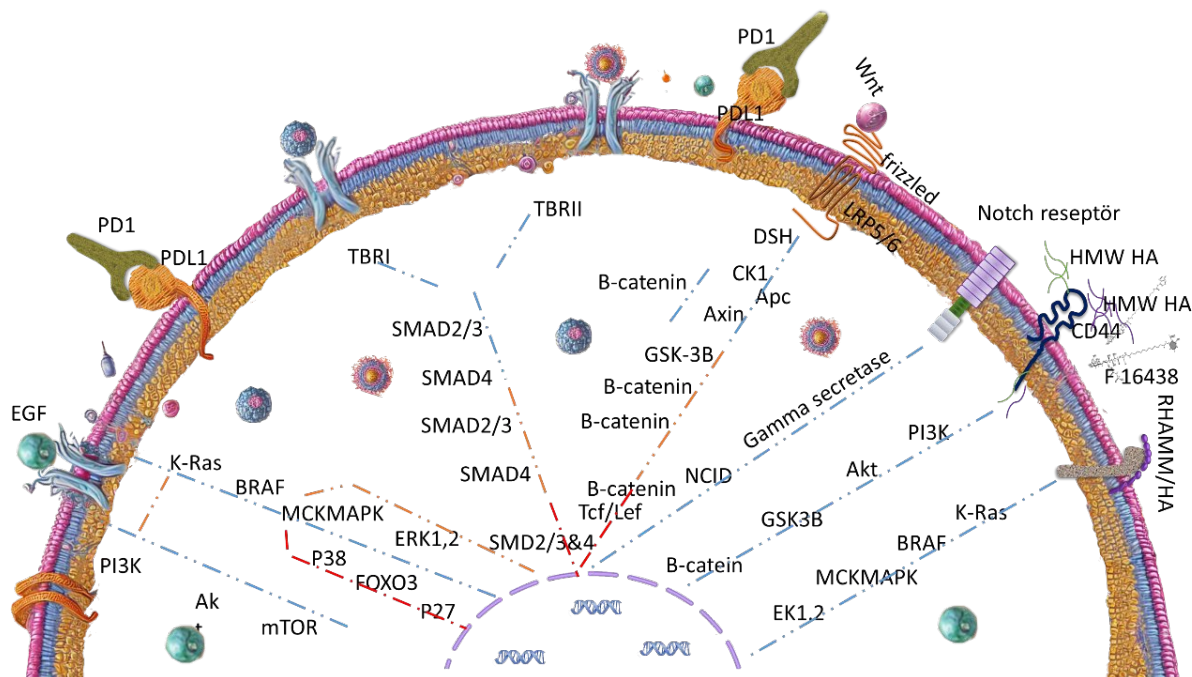


Figure 1. Overview of Signaling Pathways Involved in the Pathogenesis of TNBC

1.1.1. Strategy for targeted treatment of TNBC

Identification of cell surface receptors is of great importance for the development of target-specific ligand selection and liposomal drug delivery systems in the treatment of TNBC. The division of the disease into subtypes according to phenotypic and genotypic characteristics makes it possible to create individualized treatment strategies. In particular, the fact that the basal-like subtype is common only in TNBC cases increases the importance of this approach (10). Many cellular targets such as androgen receptor (AR), leptin receptor (LEPR), Hsp90, ICAM-1, TRAIL, CDKs, glucocorticoid receptors and Mucin 1 (MUC1) have been shown to be overexpressed in TNBC. Among these targets, AR is involved in the transcriptional regulation of breast cancer-related genes (11), while LEPR expression was reported to be increased in 92% of patients and responsible for the development of cancer stem cells (12). In metastatic TNBC, ICAM-1, a cell membrane-associated glycoprotein, as well as the PD-1 receptor found on T cells, which suppresses the immune response, have been reported to be effective in disease progression (13). Low oxygen levels in the tumor microenvironment lead to the activation of the hypoxia-inducible factor HIF- α , which causes chemotherapy resistance and facilitates the adaptation of tumor cells to processes such as epithelial-mesenchymal transition, angiogenesis, gaining immortality and metastasis (14). Therefore, strategies to suppress HIF- α appear promising in the treatment of TNBC (15). TRAIL-1 and TRAIL-2 receptors that trigger apoptosis have the potential to initiate the formation of the DISC complex that mediates cell death. Therefore, the use of TRAIL receptor agonists in combination with chemotherapeutic agents may offer a new approach in the treatment of TNBC (16).

In conclusion, overexpressed receptors and changes in the tumor microenvironment in TNBC guide targeted drug development efforts and pave the way for more effective individualized treatment approaches.

1.2. Liposomes

Liposomes were first described by D. Bangham in 1964 and derived from the Greek words “fat” (lipos) and “body” (soma). Their bilayer structure, composed of phospholipids, cholesterol, sphingolipids and hydrophilic polymers, allows them to transport both lipophilic and hydrophilic drugs. They offer significant advantages in cancer treatment with their structures suitable for surface modifications (e.g. PEGylation), long circulation time, controlled release, pharmacokinetic improvement and tumor targeting (17). Liposomes also provide benefits such as increasing drug solubility, overcoming multidrug resistance, enabling drug accumulation at the target site and reducing systemic toxicity. At the same time, they can extend their biological half-life by protecting the drugs they contain against environmental factors; their size, surface charge and other physicochemical properties can be easily adjusted (18). Parameters such as particle size, stability, surface properties and controlled release profile should be optimized for an effective liposomal therapy (19). Liposomes usually accumulate in tumor tissues through the “Enhanced Permeability and Retention (EPR) effect”; abnormal vasculature and inadequate lymphatic drainage favor this accumulation. This allows liposomal systems below 200 nm to be advantageous in tumor targeting, whereas the passage of such nanoparticles in healthy tissues is highly limited (20). Intensive research in recent years has expanded the use of liposomal drug delivery systems in cancer treatment and contributed to the development of new formulations (21).

1.2.1. Structure of liposomes

Liposomes, known as amphipathic nanocarriers, have a spherical bilayer structure containing one or more phospholipid layers that can be produced from cholesterol and natural/synthetic phospholipids (Figure 2). Lipophilic and hydrophilic substances are encapsulated in the lipid bilayer and the inner aqueous region, respectively (20). Liposomes are classified according to their size and number of lamellae (lipid bilayer). Along with multilamellar structures such as multilamellar (ML, 0.5-5 μ m) and multivesicular (MV, >1 μ m), unilamellar liposomes are also divided into three groups: small (20-200

nm), large (>200 nm) and giant ($\geq 1 \mu\text{m}$). Structural features, especially the number of lamellae and vesicle diameter, are among the parameters that directly affect drug loading capacity (22).

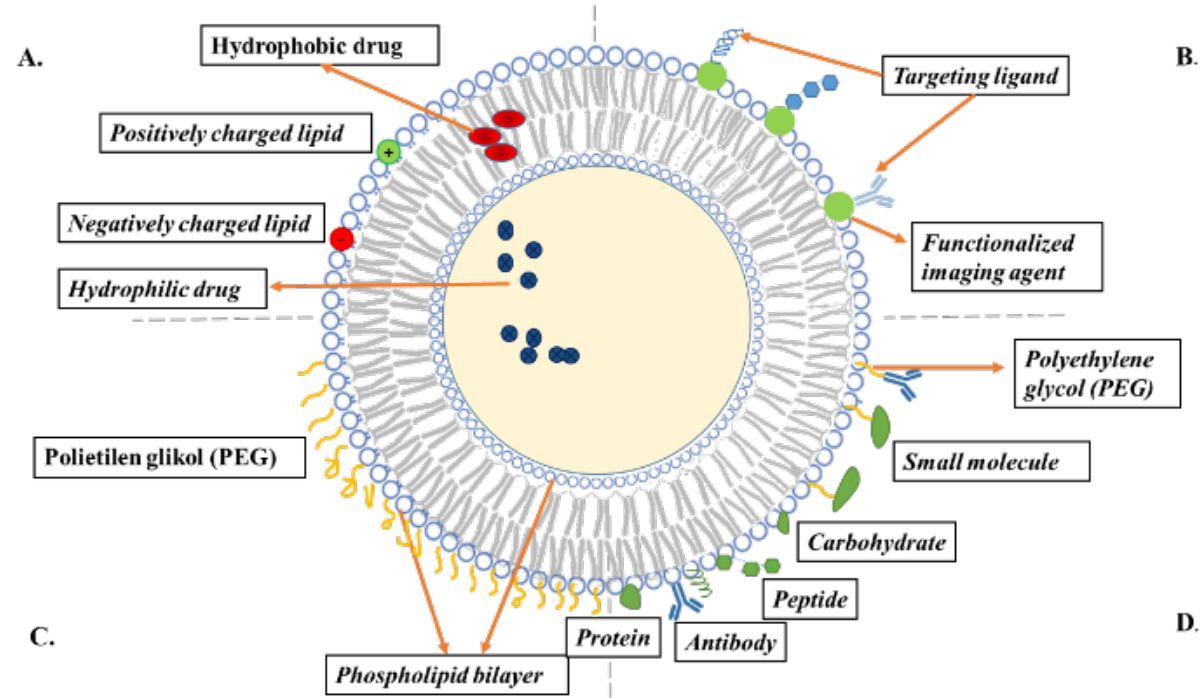


Figure 2. A. General Representation of Liposome Structure B. Functionalized Liposome Structures; (a) Conventional Liposome, (b) Theranostic Liposome, (c) Polyethylene Glycol (PEG) Coated Liposome, (d) Ligand-Targeted Liposome

1.2.2. Synthesis methods of liposomes

Liposomes can be synthesized by multiple methods. In this section, the most widely used methods such as thin film hydration, solvent injection, reverse phase evaporation, dehydration-rehydration, supercritical fluid, microfluidics, freeze-thaw, detergent dialysis and sonication are discussed. Table 1 evaluates the advantages and disadvantages of these methods and provides a brief overview of their effectiveness, scalability and application-specific suitability (20,23,24).

Table 1. Advantages and Disadvantages of Liposome Synthesis Methods

Liposome Synthesis Method	Methodology	Advantages	Disadvantages
Thin Film Hydration	• Lipids are dissolved in organic solvents. • This solution is evaporated to obtain a thin lipid film. • The film is mixed with water to form liposomes.	• Easy to apply. • It is a common and well-known method.	• Scaling is difficult. • Complete removal of organic solvent is difficult.
Solvent Injection	• Lipids are dissolved in organic solvent. • The solution is injected into water.	• It's simple, fast and scalable.	• Size distribution is heterogeneous. • Low encapsulation efficiency.
Reverse Phase Evaporation	• Lipids are dissolved in solvent, dried. • Dissolve again with organic solvent and add water. • Emulsion is formed by sonication.	• Provides high encapsulation efficiency.	• There is a risk of organic solvent residues.

Table 1 (Continued)

Detergent Dialysis	- Phospholipids are dissolved with a certain amount of detergent. - The detergent is gradually removed by dialysis or column chromatography.	Homogeneous and controlled liposomes suitable for encapsulation of proteins and biomolecules are formed.	- Processing time may be long. - There is a risk of detergent residue.
Supercritical Fluids	- Phospholipids and other components are dissolved in supercritical CO₂. - Liposomes are formed by removing the solvent or adding the aqueous phase.	- It is an environmentally friendly method. - Low solvent residue. - Scalable. - Can work at low temperature, so biomolecules are not damaged.	- High cost. - Limited lipid solubility. - Difficult to optimize.
Dehydration-Rehydration	- Lipids are dispersed in water. - Water is removed to form a film. - The film is rehydrated with water to obtain large liposomes.	Large liposomes are formed and provide high encapsulation efficiency.	There is size heterogeneity
Microfluidics	- The lipid solution (organic phase) and the aqueous phase are passed through separate microchannels. - At the junction of the microchannels, controlled mixing and solvent diffusion takes place. - Liposomes are formed and collected from the system.	- Size distribution is narrow and controllable. - Repeatability is high. - Low solvent consumption. - Fast and scalable.	- The cost is high. - Optimization is difficult. - Production volume is low.

1.2.3. Liposome analysis methods

Characterization of liposomes requires extensive physicochemical analysis to ensure their performance in vitro and in vivo (Table 2). Parameters such as size, polydispersity index (PDI) and zeta potential of liposomes are of critical importance (25). Size distribution is determined by methods such as dynamic light scattering (DLS) and nanoparticle tracking analysis (NTA), while PDI reveals the monodispersity or polydispersity state of the sample (22). Zeta potential is used to assess the colloidal stability of liposomes and interparticle electrostatic interactions; A zeta potential evaluated beyond the threshold of positive or negative 30 mV reduces the risk of particle aggregation. Furthermore, the morphological structure of liposomes is examined by methods such as electron microscopy (TEM) and cryo-TEM to determine their shape, lamellarity and phase behavior (T_c, phase transition temperature); these parameters have a direct effect on the drug encapsulation efficiency (EE) and release profile of liposomes (24). Encapsulation efficiency is defined as the ratio of the amount of free drug to the amount of encapsulated drug, and this ratio can be measured by both direct and indirect methods (such as UV-Vis, fluorescence spectroscopy, HPLC, LC-MS) (20).

Table 2. Liposome Analysis Methods

Characterization Parameter	Features	Techniques Used	Important Points
Size and Polydispersity Index (PDI)	- Average size of liposomes (usually between 50-200 nm) and indicates uniformity of size distribution within the sample. - Small size allows long circulation time; low PDI (<0.3) indicates monodispersity.	- Dynamic light scattering (DLS) - Nanoparticle Tracking Analysis (NTA)	- DLS makes measurements based on Brownian motion; - NTA provides confirmatory information by tracking individual particle motions.
Zeta Potential	Electrical charge on the surface of liposomes; values of +30 mV or -30 mV and above indicate stability.	Zeta potential measurement (electrokinetic methods, laser Doppler)	- It is influenced by environmental factors such as pH, temperature, ionic strength and viscosity. - Surface charge is critical in determining colloidal stability.
Shape (Morphology)	The structural arrangement of liposomes includes morphological features such as bilayer (lamellar) structure, roundness and homogeneity.	- Transmission Electron Microscopy (TEM) - Cryo-TEM - Atomic Force Microscopy (AFM)	- Structural changes can occur during TEM sample preparation. - Cryo-TEM has the advantage of preserving the original structure. - AFM, on the other hand, offers a high-resolution 3D image.
Lamellar Structure	Determining the number of layers of liposomes affects encapsulation efficiency and drug release profile.	³¹P-NMR, SAXS, trapped volume measurements	The interlayer phospholipid ratio is important in the lamellarity calculation.
Phase Behavior	The fluidity and phase transition temperature (T_c) of the lipid membrane affect properties such as drug passage through the membrane, fusion, stability and protein binding.	- Differential Scanning Calorimetry (DSC) - Thermogravimetric Analysis (TGA) - FTIR - XRD	Phase behavior varies depending on the physicochemical properties of the membrane; accurate measurement is important in predicting stability and release profile.
Encapsulation Efficiency (EE)	The ratio of the amount of encapsulated drug to the total amount of drug used indicates the efficiency of the liposome formulation.	- UV-Vis - HPLC - LC-MS ¹H-NMR	- Measurement is done by direct (liposome digestion) or indirect (free drug analysis) methods. - It should be determined by accurate separation methods.

Table 2 (Continued)

Drug Loading and In Vitro Release	• Method of drug loading into liposomes and determination of release profile; active and passive loading methods kullanılarak ilacın kontrollü salımı sağlanır.	• Dialysis method, standard drug analysis techniques (UV, HPLC etc.)	• Dialysis bag should be selected appropriately. • In vitro performance is evaluated by calculating the cumulative release percentage.
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1.3. Characteristics of various liposomal nanocarriers used in TNBC treatment

The therapeutic efficacy of liposomal nanocarriers varies depending on the type, size and formulation method of liposomes used. Especially in the treatment of TNBC, carrier size directly affects the circulation time; liposomes in the range of 50-200 nm are considered ideal due to both the low risk of elimination by RES and the advantage of accumulation in tumor tissues (26). The reticuloendothelial system (RES), together with the mononuclear phagocyte system (MPS), clears nanoparticles from the circulation. Particles below about 10 nm are rapidly eliminated by the kidneys, while larger particles are retained in the RES organs via the MPS (27). Conventional liposomes can be converted into "stealth" form by coating them with polymers such as poly (ethylene glycol) (PEG). This modification prolongs circulation time by preventing opsonization and delays recognition by RES. The bilayer structure of liposomes increases drug stability against external factors, while their self-assembly properties, together with their high encapsulation capacity, low toxicity and immunogenicity, make them versatile carriers (28). Furthermore, selective accumulation in tumor cells can be achieved through "active targeting" by adding targeted ligands to their surfaces.

1.3.1. Target-specific liposomal systems in TNBC therapy

Two basic approaches are adopted for target-specific liposome design. In the first, ligands are directly incorporated into the drug carrier system, while in the second, target molecules are bound by modifying the surface of previously prepared liposomes. Surface modification is more advantageous in terms of reducing drug release problems. The targeted efficacy of liposomes depends on many factors such as the properties of the ligand used (binding efficiency, structure, conjugation type), the physicochemical parameters of the carrier (size, surface charge, biodegradability) and the structure of the therapeutic agent and its interaction with the target site. In addition, tumor type, size and receptor expression intensity are also important clinical parameters that determine treatment success. Liposomes modified with specific molecules such as antibodies, peptides, folates, aptamers have the ability to recognize and selectively bind to target cell receptors. Antibody-coated immunoliposomes, the first example of these systems, were found to be more effective than non-target specific ones (29). Peptide ligands with low molecular weight and easy penetration into the cell are also effective tools for tumor targeting. In particular, folic acid, which is non-immunogenic and can be taken into the cell by endocytosis, stands out as a safe and effective targeting tool in TNBC treatment.

1.3.2. Liposomes developed with peptide-based targeting in TNBC treatment

Recent studies have revealed that peptides can be effective carriers for the delivery of chemotherapeutic drugs due to their high selectivity, low toxicity and strong affinity to the target tissue. Peptide functionalized liposomes are designed to target receptors overexpressed in cancer cells, tumor tissues and angiogenic vasculature (14).

G-protein coupled receptors (GPCRs), growth factor receptors (EGFR, ErbB, HER) and integrin receptors have been considered ideal targets due to their widespread presence in various cancer subtypes and tumor vasculature. Liposomal formulations conjugated with peptides specific for these receptors are reported to provide tumor site-specific targeting and efficient drug release (15,30). In particular, the G-protein coupled CXCR4 receptor interacts with CXCL12 to promote cell migration in various cancers

including TNBC. However, long-term use of CXCR4 antagonists has limitations (31). Therefore, liposomal systems that optimize CXCR4 signaling based on peptide density have been developed. Liposomes modified with DV1 peptide offer an alternative option to existing antagonists by providing high resistance to CXCR4, low toxicity and possible immunosuppressive effect (19).

In addition, liposomes functionalized with EMC peptide enable controlled drug delivery by enabling tumor microenvironment-specific release of drugs such as doxorubicin and tariquidar under the influence of MMP-2 enzyme. In the treatment of TNBC, a miRNA sense strand silencing the Slug gene was loaded into liposomes modified with DSPE-PEG2000-tLyp-1 peptide; when combined with functionalized liposomes carrying vinorelbine, tumor growth was reported to be almost completely inhibited (32).

1.3.3. Liposomes developed with antibody-based targeting in TNBC treatment

Antibodies with a molecular weight of approximately 150 kDa are Y-shaped glycoproteins produced by the immune system against antigens and are widely used in the functionalization of nanocarrier systems. The Fab region of antibodies binds to the target antigen, while the Fc region is usually used for conjugation to the nanoparticle surface. Antibody binding to liposomes is achieved by adsorption, covalent binding (carbodiimide, maleimide, "click" chemistry) or avidin-biotin interaction. Covalent methods are particularly advantageous in terms of stability and binding efficiency, and carbodiimide and maleimide chemistries stand out in this context (33).

There are various liposomal systems developed with target-specific antibodies for the treatment of TNBC. For example, cetuximab, developed against EGFR, shows synergistic effect with chemotherapy and radiotherapy; its combination with taxanes is also applied in TNBC treatment (34). Atezolizumab, a monoclonal antibody targeting PD-L1, has received FDA approval for use in combination with nab-paclitaxel in metastatic TNBC and is the first immune checkpoint inhibitor approved in TNBC. Similarly, other ICI agents such as pembrolizumab are being actively investigated. Necitumumab and nimotuzumab, which bind to EGFR, are IgG1 class monoclonal antibodies being evaluated in TNBC. Panitumumab is another EGFR-specific antibody being developed for triple negative inflammatory breast cancer (35). Sacituzumab govitecan is a combination of a TROP2-targeted IgG1 antibody and the topoisomerase inhibitor SN-38 and is particularly effective in TNBC subtypes with high TROP2 expression (36). In antibody-based systems, Guo et al. recently developed dual antibody liposomes targeting ICAM1 and EGFR simultaneously. This system enabled more efficient cell binding and endocytosis compared to conventional single-targeted constructs and significantly increased therapeutic efficacy in TNBC cells when used in combination with liposomal doxorubicin (37,38).

1.3.4. Liposomes developed with polymer-based targeting in TNBC treatment

One of the most common methods to increase the stability of liposomes and prolong their circulation time is polyethylene glycol (PEG) coating. PEGylation is considered a passive targeting strategy and can increase the solubility of liposomes and prolong their circulation time up to tenfold, resulting in higher accumulation in target tissues. PEGylated liposomes can be made more selective by active targeting strategies. For this purpose, functional groups such as amino, carboxyl or maleimide can be added to the ends of PEG chains to form covalent bonds with specific ligands. Thus, targeting ligands added to the vesicle surface recognize specific cell surface receptors, allowing the drug to be delivered directly to the tumor microenvironment (39).

Apart from PEG, other biopolymers are also used for coating. For example, hyaluronic acid (HA) shows high affinity for CD44 receptors, which are overexpressed in TNBC. HA-coated liposomes thus easily enter target cells, while their negative charge reduces protein adsorption and prolongs the circulation time. Chitosan oligosaccharide (CO) coated liposomes are similarly used in CD44-targeted diagnostic and therapeutic applications. The HA-coated liposomal system containing epalrestat (EPS) and

doxorubicin (DOX) developed by Dong et al. suppressed epithelial-mesenchymal transition (EMT) and reduced cancer stem cells in TNBC. Animal studies in 4T1 tumor model showed that this system significantly inhibited tumor growth and metastasis (40). In conclusion, liposomes coated with polymers such as PEG, HA and CO stand out as effective drug delivery systems in aggressive cancer types such as TNBC due to their high biocompatibility, target-specific binding and strong antitumor effects.

1.3.5. Liposomes developed with aptamer-based targeting in TNBC treatment

Aptamers consist of artificially synthesized short DNA or RNA sequences and bind to their targets with high specificity and binding affinity. Due to their small size, low immunogenicity and structural stability, they have attracted attention as an alternative to antibodies in targeted drug delivery systems. Aptamers are usually attached to liposomes via chemical conjugation to the ends of PEG chains or lipid components. Electrostatic interactions can also be used, but this method is rarely preferred as it can disrupt the secondary structure of the aptamer (41,42). Aptamers integrated into liposomes by covalent binding techniques enable selective accumulation in target tumor cells. This increases cytotoxic efficacy and minimizes systemic side effects (43). Unlike antibodies, aptamers do not elicit an immune response because they do not carry an Fc region and can remain in tumor tissue for a longer time (44). The anti-CD44 aptamer Apt1, which shows high affinity for the CD44 receptor, was used by Alshaer et al. on liposomes carrying siRNA. This system, complexed with protamine, provided effective targeting in cancers where CD44 is overexpressed, including TNBC, and was shown to successfully suppress related gene expression (45). In conclusion, aptamer-based targeting systems offer significant potential for tumor specificity, biocompatibility and drug efficacy in the treatment of TNBC.

1.3.6. Use of liposomes targeted with other ligands in TNBC treatment

Small water-soluble molecules such as folate acid (FA) and biotin are widely used as targeting ligands for liposomal drug carriers due to their low immunogenicity, low cost and easy conjugation (46). Belfiore et al. developed liposomes loaded with N-alkylisatin (N-AI) functionalized with PAI-2 (SerpinB2) to target uPA/uPAR receptors. This system provided higher cellular uptake and cytotoxicity, particularly in MDA-MB-231 cells compared to MCF-7, which showed low uPAR expression. The findings revealed the potential of uPAR expression-dependent targeting in TNBC (47). Barbosa et al. reported that pH-sensitive, folate-modified paclitaxel (PTX)-loaded liposomes showed significant cytotoxic effect in MCF-7 and MDA-MB-231 cells and low toxicity in normal cells (48). In another study with curcumin-loaded, folate-modified PEGyl liposomes, 3.5-fold higher cytotoxicity and significant tumor shrinkage were achieved compared to non-targeted systems (49). Finally, Guo et al. developed a non-cationic liposome-hydrogel hybrid system carrying CRISPR plasmids containing Cas9 and guide RNA targeting the Lipocalin 2 (Lcn2) gene. This system suppressed Lcn2 expression up to 80% in TNBC cells and reduced tumor volume by 77% in animal models (50).

These studies show that small molecule ligands and gene editing technologies can significantly improve treatment efficacy when combined with targeted liposomal therapeutic approaches in aggressive tumors such as TNBC.

2. Conclusion and Recommendations

Liposomal nanocarriers, developed to improve drug efficacy and reduce side effects, offer a promising strategy, especially for treatment-resistant cancer types. Given the limitations in the treatment of TNBC, it is noteworthy that these systems are an effective alternative to conventional approaches. FDA-approved liposomal formulations such as Doxil®/Caelyx®, Myocet®, Lipodox® and Lipusu® have improved treatment success by enabling targeted drug release via PEGylation and EPR. The efficacy of liposomes in challenging tumor types such as TNBC, thanks to their ability to increase bioavailability, reduce systemic toxicity and provide tumor-specific drug delivery, has made them an important tool in oncological therapy. In the future, innovative approaches such as the development of liposomal

formulations personalized according to the genetic and biochemical structure of the tumor; pH, temperature or enzyme sensitive smart systems, immunotherapy combinations and multifunctional carriers are predicted to be at the forefront. In order to translate these advances into clinical practice, it is necessary to establish standardized production protocols, accelerate regulatory processes and strengthen academia-industry collaboration. Moreover, the integration of digital technologies such as artificial intelligence and machine learning into these processes will make significant contributions at many stages, from formulation development to prediction of treatment response. In conclusion, liposomal drug carriers have the potential to not only support current therapies, but also to be the cornerstone of future personalized and targeted oncological therapies.

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Sociodemographic and Behavioral Factors Affecting Patient-Centered Care Competence in Home Care Staff in the Turkish Republic of Northern Cyprus

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Abstract: The main aim of this study was to determine the effect of some sociodemographic characteristics and care behaviours of municipal staff caring for patients at home on patient-centred care competency levels.

The population of this descriptive study consisted of 60 personnel providing health and care services to patients registered to Home Health Services. In the study, 60 nurses who accepted to participate in the study were included in the study. The data of the study were collected by using 'Descriptive Characteristics Form, (BDI-24) and (HMBYÖ)'.

As a result of the study, it was found that the mean age was 28.91 ± 3.61 , 56.7% were female, 93.3% were undergraduate graduates, 68.3% were single, the mean score of the Care Behaviour Scale was 4.31 ± 1.01 , the highest score was 4.38 ± 1.02 from the assurance sub-dimension and the lowest score was 4.21 ± 1.13 from the commitment sub-dimension. The mean score of the Patient-Centred Care Competency Scale was 68.22 ± 14.14 , the highest score was 23.70 ± 5.27 from the sub-dimension of respecting the patients' point of view, and the lowest score was 12.23 ± 2.75 from the sub-dimension of patient advocacy.

As a result of the study, it was determined that although the perceptions of the care staff regarding the quality of care were positive, the competence level of patient-centred care competence was high.

Keywords: Home Care Personnel, Care Behaviors, Patient-Centered Care Competency Level

1. Introduction

The holistic health approach of the 21st century views individuals as biological, psychological, and social beings, emphasizing that they should be evaluated within the context of their own environment. Rising expectations from healthcare services and the demand for high-quality treatment and care have significantly increased the responsibilities of service providers and care teams, particularly with respect to the quality of services offered. Consequently, there is an ongoing need for new perspectives in treatment and care delivery (1).

Advancements in healthcare services and increased life expectancy have contributed to a higher prevalence of chronic diseases, which in turn has led to a rise in the number of disabled and bedridden patients among both young and adult populations (2). Changes in family structures—particularly the transition to nuclear families and increased female workforce participation—have heightened the need for treatment and care for bedridden individuals with chronic illnesses. In this context, home care services have gained importance, as they enable individuals requiring care to live more healthily in their own environments by utilizing human resources and technology beyond family members.

However, significant challenges remain in the delivery of home care services, both in Türkiye and in the Turkish Republic of Northern Cyprus (TRNC). These challenges include insufficient legal regulations, inadequate job security, low salaries, lack of clear job descriptions, communication issues, limited

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equipment, insufficient training, lack of regular inspections, and transportation difficulties (3). Addressing these issues is essential for ensuring the quality and sustainability of home care services.

Supporting home care staff is particularly important, given the intensity of their working conditions and the need to maintain and improve service quality. Studies in both Türkiye and the TRNC have reported that home care personnel often experience difficulties fulfilling their responsibilities, facing challenges related to institutional structure, working environment, patient and family communication, and professional competence (4–6).

In recent years, patient-centered care has emerged as a key component of healthcare delivery. First defined by Michael Balint as understanding patients as unique individuals (7), this approach is recognized as a cornerstone of modern healthcare systems, aimed at increasing patient satisfaction and improving health outcomes (8). According to the literature, patient-centered care is associated with better health conditions, increased organizational commitment, reduced unnecessary healthcare utilization, and improved care quality (9).

In home care services, adopting a patient-centered approach is particularly critical due to the complexity of patients' needs and the high degree of interaction between staff and patients. This model emphasizes mutual respect, shared decision-making, and tailoring care to patients' values, preferences, and needs (10–14). It has also been shown to reduce unnecessary diagnostic procedures, medications, and hospital referrals, while facilitating care delivery in patients' own environments (15,16).

Despite the importance of home care services, studies have reported varying levels of patient satisfaction, with some indicating inadequacies in communication, explanations provided by staff, and the comprehensiveness of care (17). The professional values of home care staff—shaped by factors such as age, gender, marital status, education, experience, and job position—play a determining role in their competence and in the quality of relationships established with patients, team members, and society (18,19).

Previous research in Türkiye has highlighted deficiencies in training, multidisciplinary collaboration, and organizational structure in home care units (20). While the scope of home care services continues to evolve to meet societal needs, the development of staff through structured training, orientation, in-service programs, and certification is essential to ensuring quality and continuity of care (21).

To date, no study has examined this topic in the TRNC. This research therefore aims to fill this gap by investigating the effect of selected sociodemographic characteristics and care behaviors of municipal home care personnel on their levels of competence in delivering patient-centered care.

1.2. Study questions

1. Do some sociodemographic characteristics of caregivers affect their patient-centered care competence level?
2. Do the care behaviors of patients and caregivers affect the level of patient-centered care competence?

2. Method

2.1. Study design

The research, designed as a descriptive and cross-sectional study, was conducted between 27 February and 30 May 2023 in units providing home health care services within the municipalities of Nicosia, Famagusta, Kyrenia, and other district municipalities.

2.2. Population and sample of the study research

The population of the study consisted of 24 nurses working in the Nicosia Municipality Home Health Services Unit, 28 nurses in the Famagusta Municipality Home Health Services Unit, and 8 nurses in the

Kyrenia Municipality Home Health Services Unit, totalling 60 nurses. No sampling was performed; instead, the entire population was targeted, and all personnel who voluntarily agreed to participate were included in the research. Thus, the sample of the study comprised all 60 nurses in the population. The study was conducted with the approval of the Clinical Research Ethics Committee of Cyprus Science University Graduate Education and Research Institute (dated 25.04.2023, decision number 2023/04.008). Prior to data collection, both written and verbal informed consent was obtained from all participants in accordance with ethical principles.

2.3. Data collection tools

Data were collected using the Descriptive Characteristics Form, Care Behavior Scale-24 (BDI-24) and Patient-Centered Care Competency Scale. The descriptive characteristics form (age, gender, marital status, social security, educational status, etc.), which the researchers created by conducting literature research, consists of 13-item questions (5,6,7).

The Caring Behaviors Inventory (CBI) is a measurement tool developed to assess the nursing care process and the quality of care provided to patients (20,21). Originally developed in 1994 by Wolf et al. as the 42-item Caring Behaviors Inventory-42 (CBI-42) to evaluate the caring behaviors of both patients and nurses, the scale was later shortened to a 24-item version, the Caring Behaviors Inventory-24 (CBI-24), by Wu et al. in 2006 (20,21). The validity and reliability study of the CBI-24 in Türkiye was conducted by Kurşun and Kanan (2010), who reported Cronbach's alpha values of 0.97 for patients and 0.96 for nurses. The CBI-24 consists of 24 items grouped under four subdimensions: assurance, knowledge-skills, respect, and commitment. Responses are scored on a 6-point Likert scale. The total score is calculated by summing the item scores and dividing by 24, whereas subdimension scores are obtained by summing the relevant item scores and dividing by the number of items in that subdimension. The scale can be administered to both patients and nurses and demonstrates high internal consistency. Higher scores indicate higher perceived quality of nursing care (22). In the present study, the Cronbach's alpha coefficient for the CBI-24 was calculated as 0.981, indicating excellent internal consistency.

Patient-Centered Care Competency Scale Saygılı, Kar, and Uğurluoğlu (2020) conducted a Turkish validity and reliability study of a scale consisting of 17 statements developed by Hwang (2015) in South Korea. This scale is used to assess patient-centred care competence. The scale consists of three dimensions: Encouraging Patient Participation in Care Processes, Ensuring Patient Comfort and Patient Advocacy. The statements are evaluated using a Likert scale ranging from 'Strongly Disagree' to 'Strongly Agree'. According to the results of the study, the total mean score of the scale was 57.45 out of 70. The mean score of patient-centred care competencies of nurses and midwives was calculated as 4.1 out of 5. The value obtained as a result of Cronbach's Alpha analysis to determine the reliability of the scale is 0.915. This result shows that the scale has sufficient reliability. This study provides important findings on the validity and reliability of a scale that can be used to assess patient-centred care competencies in Turkish-speakin.

The value of 0.915 obtained in this study shows that the scale is reliable. In addition, item-total correlations and Cronbach's Alpha coefficients were calculated for each item of the scale using the item dropping technique (Table 2). Accordingly, considering that the Cronbach's Alpha values of the scale ranged between 0.91-0.92 and the item-total correlations ranged between 0.51-0.72, it is seen that the scale exhibits a consistent structure on an item basis. In general, item-total correlation values of 0.30 and above are desirable (2).

2.4. Data collection method

Data were collected between 27 February and 30 May 2023 from home care personnel working in the municipalities of Nicosia, Famagusta, Kyrenia, and other district municipalities of the Turkish Republic

of Northern Cyprus. The data collection process was conducted in person at the participants' workplaces. The study forms, which included the Sociodemographic Characteristics Form, the Caring Behaviors Inventory-24 (CBI-24), and the Patient-Centered Care Competence Scale, were distributed to the participants by the researcher. Participants completed the forms themselves without any intervention from the researcher. The completion of all forms took approximately 20 minutes per participant. After the forms were filled in, they were collected by the researcher on the same day.

2.5. Evaluation of data

The data were entered in the SPSS (25.0) program and non-parametric techniques were used to evaluate the data. Spearman-Rho correlation coefficient technique, which is the non-parametric equivalent of the Pearson product correlation coefficient technique, was used to compare continuous variables. In addition, the "Mann Whitney U Test" technique was used to compare two groups, and the "Kruskal-Wallis H Test" technique was used to compare three and more groups. When the results of the "Kruskal-Wallis H Test" were significant, the "Mann Whitney U Test" technique was used to test the question of which groups there were significant differences. When there was a significant difference between the two groups, Bonferroni correction was applied.

3. Results

As shown in Table 1, 66.7% of the participating nurses were aged 29 years or younger, with a mean age of 28.91 ± 3.61 years. The majority were female (56.7%) and held a bachelor's degree (93.3%). Most participants were single (68.3%). Regarding professional experience, 43.3% had worked in a home care unit for 3–4 years, with a mean duration of 3.90 ± 1.65 years, while 45.0% had been in the nursing profession for 3–4 years, with a mean of 3.90 ± 1.65 years. All nurses (100%) worked daytime shifts, and 36.7% reported working an additional 11–20 hours per month, with a mean of 21.35 ± 13.24 hours. Furthermore, 81.7% indicated that the workload in home care was very high, 100% stated that workload was higher during day shifts, and 91.7% reported caring for five or more patients per day.

Table 1. Descriptive Characteristics of Nurses

Variables	Number (n)	Percentage (%)
Age Groups		
29 Years and Under	40	66.7
30 Years and Over	20	33.3
Age: Ort±Sd=28.91±3.61-Median:28.0 - Min:23,0- Max:50.0		
Gender		
Male	26	43.3
Female	34	56.7
Education Status		
Health Vocational High School	---	---
Associate Degree	---	---
License	56	93.3
Master's	4	6.7
phD	---	---
Marital Status		
Married	19	31.7
single	41	68.3
Working Time in Home Care Unit		
Between 1-2 Years	13	21.7
Between 3-4 Years	26	43.3
5 Years and Over	21	35.0
Home Care Work Duration: Ort±Sd=3.90±1.65 - Median:4.0 - Min:1.0- Max:8.0		
Duration of Employment in the Nursing Profession		
Between 1-2 Years	14	23.3
Between 3-4 Years	27	45.0
5 Years and Over	19	31.7

Table 1 (Continued)

Working Time in Nursing: Mean±Sd=3.90±1.65-Median:4.0-Min:1.0 Max:8.0		
Shift Working Method		
Continuous Day	60	100.0
Continuous Night	---	---
Both of them	---	---
Shift Work Pattern		
Continuous Daytime	18	30.0
Continuous Night	22	36.7
Both	20	33.3
Monthly Working Time: Mean±Sd=21.35±13.24–Median:15.0-Min:5.0-Max: 40.0		
Defining Workload in Home Care		
Continuous Daytime	2	3.3
Continuous Night	9	15.0
Both	49	81.7
How to Define Workload in Different Shifts		
More on Day Shift	60	100.0
More on Night Shift	---	---
More on Weekend Shift	---	---
Equal in Every Shift	---	---
Number of Patients Cared for in Daily Care		
More in Day Shift	---	---
More on Night Shift	---	---
More on Weekend Shift	---	---
Equal on every shift	5	8.3
More in Day Shift	55	91.7

As seen in Table 2, used in the research; It can be said that the internal consistency coefficients of the general and sub-dimensions of the care behavior scale and the patient-centered care competency scale are highly reliable, that is, all the items that make up the measurement tool measure the same feature. More precisely, it is homogeneous in terms of the properties and features measured by both measurement tools used in the research. According to these results, the measurement tools used in the research are reliable measurement tools.

Table 2. Internal Consistency Coefficient Results of the Measurement Tool Used in the Study

Scales and Subscales	Criteria	
	Number of Questions	Cronbach's Alpha
Care Behavior Scale General	24	,981
Dimension 1: Assurance Subdimension	8	,949
Dimension 2: Knowledge-Skills Subdimension	5	,937
Dimension 3: Being Respectful Subdimension	6	,921
Dimension 4: Commitment Subdimension	5	,933
Patient-Centered Care Competency Scale	17	,964
Dimension 1: Respect for Patients' Perspective Subdimension	6	,885
Dimension 2: Promoting Patient Participation in Care Processes Subdimension	5	,894
Dimension 3: Ensuring Patient Comfort Subdimension	3	,882
Dimension 4: Patient Advocacy Subdimension	3	,866

The general and sub-dimension averages of the care behavior scale used in the research are between 4.42±1.01 and 4.21±1.13, and the general and sub-dimension averages of the patient-centered care competency scale are between 68.22±14.14 and 12.23±2. It is between .75. In addition, the internal

consistency coefficients of the general and sub-dimensions of the care behavior scale vary between .984 and .921, and the internal consistency coefficients of the general and sub-dimensions of the patient-centered care competence scale vary between .964 and .882.

Table 3. Patient-Centered Care Competency Scale and Care Behavior Scale Mean Scores

	Min	Max	Ort.	Std. Sap.
Patient-Centered Care Competency Scale	34	85	68.22±14,14	5,61
Care Behavior Scale	3.38	6.00	4.42±1,01	5.40

As shown in Table 4, marital status was found to have a significant effect on the *Ensuring Patient Comfort* sub-dimension scores of the Patient-Centered Care Competency Scale ($U = 257.0$, $p = .031$). Specifically, this indicates that nurses' marital status may influence how they perceive and implement patient comfort in home care settings.

However, no statistically significant differences were observed in the total scale scores or other sub-dimension scores with respect to age, gender, education level, duration of work in the home care unit, years of experience in the nursing profession, monthly overtime hours, workload in home care, or the number of patients cared for daily ($p > .05$). These results suggest that, apart from marital status, the examined sociodemographic and work-related variables did not significantly affect nurses' overall patient-centered care competence or the other sub-dimensions, including Respect for Patients' Perspective, Encouraging Patient Participation in Care Processes, and Patient Advocacy.

Table 4. Comparison Results of Some Descriptive Characteristics of Nurses and Patient-Centered Care Competency Scale Scores

Variables	n	HMBYÖ* Overall Score			HBSG* Sub Dimension			BSHKTE* Sub Dimension			HKS* Sub Dimension			HS* Sub Dimension		
		Mean ± SD	Min Max	Sıra Ort.	Mean ± SD	Min Max	Sıra Ort.	Mean ±SD	Min Max	Sıra Ort.	Mean ±SD	Min Max	Sıra Ort.	Mean ±SD	Min Max	Sıra Ort.
Age²																
29 Years and Under	40	69,43±11,95	32,00-81,0	31,24	24,20±4,53	10,00-29,0	31,36	20,40±3,76	7,00-24,0	31,48	12,35±2,01	7,00-15,00	28,99	12,48±2,45	5,00-15,0	31,68
30 Years and Over	20	65,80±17,84	17,00-82,0	29,03	22,70±6,51	6,00-29,00	28,78	19,30±5,21	5,00-24,0	28,55	12,05±3,58	3,00-15,00	33,53	11,75±3,29	3,00-15,0	28,15
Statistical Analysis		U= 370,5 p= ,643			U= 365,5 p= ,586			U= 361,0 p= ,535			U= 339,5 p= ,332			U= 353,0 p= ,454		
Gender t²																
Male	26	71,19±9,94	38,00-82,0	34,50	24,88±3,73	14,00-29,0	33,79	21,04±2,78	12,0-24,0	33,83	12,69±2,04	7,00-15,00	32,52	12,58±2,37	5,00-15,0	32,42
Female	34	65,94±16,43	17,00-81,0	27,44	22,79±6,09	6,00-29,00	27,99	19,26±5,06	5,00-24,0	27,96	11,91±2,96	3,00-15,00	28,96	11,97±3,02	3,00-15,0	29,03
Statistical Analysis		U= 338,0 p= ,120			U= 356,5 p= ,200			U= 355,5 p= ,191			U= 389,5 p= ,424			U= 392,0 p= ,448		
Education Status ²																
License	56	68,91±13,58	17,0-82,0	31,54	23,98±5,10	6,00-29,00	31,54	20,21±4,10	5,00-24,0	31,16	12,32±2,54	3,00-15,00	30,93	12,39±2,65	3,00-15,0	31,54
Master's	4	58,50±20,34	29,0-72,00	16,00	19,75±6,85	10,00-29,0	15,88	17,50±6,61	8,00-24,0	21,25	11,25±3,77	6,00-15,00	24,50	10,00±3,56	5,00-15,0	15,88
Statistical Analysis		U=54,00 p= ,085			U= 53,5 p= ,081			U= 75,0 p= ,266			U= 88,0 p= ,467			U= 53,5 p= ,078		
Marital Status																
Married	19	68,05±14,86	29,00-82,0	30,71	23,47±5,50	10,00-29,0	30,18	19,84±4,35	8,00-24,0	29,50	12,58±3,13	6,00-15,00	37,47	12,16±2,61	5,00-15,0	29,29
Single	41	68,29±13,98	17,00-81,0	30,40	23,80±5,22	6,00-29,00	30,65	20,12±4,31	5,00-24,0	30,96	12,10±2,35	3,00-15,00	27,27	12,27±2,85	3,00-15,0	31,06
Statistical Analysis		U= 385,5 p= ,949			U= 383,5 p= ,924			U= 370,5 p= ,759			U= 257,0 p= ,031			U= 366,5 p= ,710		
Working Time in Home Care Unit																
Between 1-2 Years	13	68,85±11,92	40,00-81,0	30,77	24,69±4,63	13,00-29,0	34,46	20,15±3,44	12,0-24,0	29,19	11,92±2,25	7,00-15,00	26,19	12,08±2,29	8,00-15,0	27,19
Between 3-4 Years	26	68,88±12,57	32,00-80,0	30,08	23,62±4,97	10,00-29,0	29,33	20,27±3,99	7,00-24,0	30,67	12,42±2,04	6,00-15,00	29,42	12,58±2,45	6,00-15,0	32,65
5 Years and Over	21	67,00±17,44	17,00-82,0	30,86	23,19±6,10	6,00-29,00	29,50	19,67±5,20	5,00-24,0	31,10	12,24±3,42	3,00-15,00	34,50	11,90±3,37	3,00-15,0	29,88
Statistical Analysis		X ² : ,027 p: ,986/---			X ² : ,865 p: ,649/---			X ² : ,103 p: ,950/---			X ² : 2,07 p: ,354/--			X ² : ,917 p: ,632/---		
Duration of Employment in the Nursing Profession																
Between 1-2 Years	14	69,86±11,87	40,00-81,0	33,46	24,79±4,48	13,00-29,0	34,57	20,57±3,39	12,0-24,0	31,96	12,21±2,36	7,00-15,00	29,54	12,29±2,33	8,00-15,0	29,21
Between 3-4 Years	27	69,26±12,13	32,00-79,0	29,87	23,78±4,77	10,00-29,0	29,33	20,22±3,90	7,00-24,0	29,93	12,56±2,06	6,00-15,00	30,87	12,70±2,32	6,00-15,0	33,44
5 Years and Over	19	65,53±18,14	17,00-82,0	29,21	22,79±6,47	6,00-29,00	29,16	19,37±5,41	5,00-24,0	30,24	11,84±3,44	3,00-15,00	30,68	11,53±3,50	3,00-15,0	27,26
Statistical Analysis		X ² : ,542 p: ,761/---			X ² : 1,00 p: ,605/---			X ² : ,136 p: ,934/---			X ² : ,059 p: ,971/---			X ² : 1,54 p: ,462/---		
Monthly Overtime																
10 Hours and Under	18	69,28±17,56	17,00-78,0	36,94	24,39±6,26	6,00-29,00	35,94	20,28±5,40	5,00-24,0	35,69	12,28±3,18	3,00-15,00	33,14	12,33±3,33	3,00-15,0	33,17
Between 11-20 Hours	22	70,95±4,77	60,00-78,0	25,98	24,36±2,74	17,00-29,0	28,14	21,00±1,77	17,0-24,0	29,43	12,68±1,52	8,00-15,00	30,02	12,91±1,15	10,0-15,0	31,50
21 Hours and Over	20	64,25±17,12	32,00-82,0	29,68	22,35±6,32	10,00-29,0	28,20	18,75±4,96	7,00-23,0	27,00	11,75±3,01	6,00-15,00	28,65	11,40±3,30	5,00-15,0	27,00
Statistical Analysis		X ² :3,99 p: ,136/---			X ² : 2,52 p: ,282/---			X ² : 2,55 p: ,279/---			X ² : ,680 p: ,712/---			X ² : 1,33 p: ,512/---		
Defining Workload in Home Care ¹																
Normal	2	44,00±38,18	17,0-71,0	11,00	15,00±12,73	6,00-24,00	11,25	13,50±12,0	5,00-22,0	18,00	8,00±7,07	3,00-13,00	15,50	7,50±6,36	3,00-12,0	10,00
More	9	63,67±17,52	29,0-81,0	27,89	22,56±6,50	10,0-29,0	28,72	18,33±5,05	8,00-23,0	24,11	11,33±2,69	6,00-14,00	22,17	11,44±3,50	5,00-15,0	27,44
Too Much	49	70,04±11,50	32,0-82,0	31,78	24,27±4,47	10,0-29,0	31,61	20,61±3,56	7,00-24,0	32,18	12,59±2,25	6,00-15,00	32,64	12,57±2,29	5,00-15,0	31,90
Statistical Analysis		X ² : 2,97 p: ,226/---			X ² : 2,75 p: ,252/---			X ² : 2,76 p: ,251/---			X ² : 4,44 p: ,108/---			X ² : 3,45 p: ,178/---		
Number of Patients Cared for in Day Care																
Four Patient	5	67,60±7,33	59,0-75,0	22,40	23,60±2,97	19,0-27,0	24,10	19,80±2,77	16,0-23,0	24,00	12,00±2,00	9,00-14,00	25,40	12,20±1,30	10,0-13,0	24,80
Five Patients and Over	55	68,27±14,64	17,0-82,0	31,24	23,71±5,45	6,0-29,0	31,08	20,05±4,42	5,00-24,0	31,09	12,27±2,67	3,00-15,00	30,96	12,24±2,85	3,00-15,0	31,02
Statistical Analysis		U= 97,00 p= ,277			U= 105,5 p= ,389			U= 105,0 p= ,378			U= 112,0 p= ,486			U= 109,0 p= ,439		

Note: Bonferroni Correction applied-1: Kruskal Wallis H Test - 2: Mann Whitney U * PCCS: Patient-Centered Care Competency Scale, HBSG: Respect for Patients' Perspective, PBSCTE: Encouraging Patient Participation in Care Processes, HKS: Ensuring Patient Comfort, HS: Patient Advocacy

As shown in Table 5, the total scores of the Caring Behaviors Scale were significantly and moderately positively correlated with the overall scores of the Patient-Centered Care Competency Scale ($r = .585$, $p < .001$) and its sub-dimensions, including respect for patients' perspectives ($r = .520$, $p < .001$), encouraging patient participation in care processes ($r = .515$, $p < .001$), ensuring patient comfort ($r = .460$, $p < .001$), and patient advocacy ($r = .371$, $p < .001$). These results indicate that nurses demonstrating higher overall caring behaviors are more likely to exhibit stronger patient-centered care competencies across multiple dimensions.

When examining the sub-dimensions of the Caring Behaviors Scale, the assurance sub-dimension scores showed significant moderate positive correlations with the overall Patient-Centered Care Competency Scale scores ($r = .582$, $p < .001$) and all its sub-dimensions, while the knowledge-skill sub-dimension was positively correlated with the overall scale ($r = .494$, $p < .001$) and all sub-dimensions except patient advocacy, where no significant relationship was found. Similarly, the respectful sub-dimension demonstrated moderate positive correlations with all patient-centered care competencies (ranging from $r = .382$ to $r = .555$, $p < .001$), highlighting that specific aspects of caring behaviors are linked to improved patient-centered care practices.

Finally, the commitment sub-dimension of the Caring Behaviors Scale was significantly and moderately positively associated with the overall Patient-Centered Care Competency Scale scores ($r = .534$, $p < .001$) and all sub-dimensions, including respect for patients' perspectives, encouraging patient participation, ensuring patient comfort, and patient advocacy. Collectively, these findings emphasize that higher levels of nurses' caring behaviors, across multiple dimensions, are closely related to enhanced patient-centered care competencies. The comparisons between these scales and selected personal variables from the participants' information form are presented sequentially in the tables, providing further context for interpreting these relationships.

Table 5. Correlation Results of the Scales Used in the Study

Criteria	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. General Care Behavior Scale	1									
2. Assurance Sub-Dimension	---	1								
3. Knowledge-Skill Sub-Dimension	---	---	1							
4. Respectfulness Sub-Dimension	---	---	---	1						
5. Commitment Sub-Dimension	---	---	---	---	1					
6. Patient-Centered Care Competency Scale	,585**	,582**	,494**	,555**	,534**	1				
7. Respecting Patients' Perspectives Sub-Dimension	,520**	,517**	,468**	,492**	,445**	---	1			
8. Sub-Dimension of Encouraging Patient Participation in Care Processes	,515**	,573**	,444**	,475**	,487**	---	---	1		
9. Ensuring Patient Comfort Sub-Dimension	,460**	,467**	,428**	,450**	,489**	---	---	---	1	
10. Patient Advocacy Sub-Dimension	,371**	,339**	0,241	,382**	,388**	---	---	---	---	1

**:.001

4. Discussion

Nurses' caring behaviors and patient-centered care are fundamental components of high-quality care and play a critical role in ensuring patient safety. In this study, the findings highlight that nurses' care behaviors and their competency in patient-centered care directly reflect the level of care provided. These results align with previous research, which emphasizes that both care behaviors and patient-centered approaches are essential indicators of the quality of nursing practice (23). By demonstrating this relationship, the study contributes to the understanding of how nurses' professional behaviors impact patient outcomes, filling a gap in the literature regarding municipal home care settings.

Nurses' care behaviors and patient-centered care levels are essential for delivering high-quality healthcare, particularly in home care settings. In this study, nurses' mean HMBRQ score was 68.22 ± 14.14 , indicating a high level of patient-centered care competency, while their mean BDI score was 4.42 ± 1.01 , reflecting a moderate level of caring behaviors. These findings demonstrate that while nurses generally possess strong patient-centered care competencies, there is room to enhance their practical caring behaviors, which aligns with the study's aim of evaluating both constructs in the context of municipal home care services. Furthermore, a significant correlation was observed between the knowledge-skill sub-dimension of the Caring Behaviors Inventory and the overall and sub-dimension scores of the Patient-Centered Care Competency Scale, emphasizing that nurses who demonstrate higher clinical knowledge and skills are more likely to engage in patient-centered practices. This correlation highlights the interaction between competence and behavior, confirming that improving nurses' professional skills may directly enhance patient-centered care. Comparisons with prior studies support these findings: previous research reported moderate patient-centered care competency among healthcare providers, indicating that socio-demographic and professional factors, such as age, experience, and voluntary choice of unit, play a role in shaping care behaviors (25,26). The present study fills a gap in the literature by examining these relationships specifically among municipal home care nurses, providing evidence that targeted interventions to develop both knowledge and caring behaviors can improve patient outcomes and align care practices with patient-centered principles.

In the current study, the socio-demographic and professional characteristics of the nurses were carefully examined to understand their potential impact on patient-centered care and caring behaviors. The mean age of the nurses was 28.91 ± 3.61 years, 56.7% were female, 93.3% held a bachelor's degree, 68.3% were single, and 43.3% had been working in the home care unit for 3 to 4 years (mean duration 3.90 ± 1.65). All participants worked continuously during the day, 81.7% reported a very high workload in home care, 100% experienced higher workload during the day shift, and 91.7% cared for five or more patients per day. These findings suggest that workload and professional experience may play a critical role in shaping nurses' care behaviors and patient-centered care competency, highlighting the need to consider these factors in developing targeted interventions. Similar patterns were reported in previous studies: Kossiori et al. (2021) found that nurses in surgical and internal medicine departments in Greece were predominantly young, single, and faced high workloads, while another study with 203 nurses reported that over half of the participants were female, mostly had undergraduate degrees, and experienced excessive workloads (27,28). The alignment between the current findings and prior research underscores that socio-demographic characteristics and work conditions consistently influence nurses' ability to deliver high-quality, patient-centered care. By contextualizing these variables, the study contributes to the literature by emphasizing the importance of supporting nurses in high-demand environments to optimize care outcomes.

In this study, nurses with five or more years of professional experience in home care were found to have statistically significantly higher patient-centered care competency scores compared to those with less experience. This finding highlights the influence of professional tenure on the development of care behaviors and competency levels. Moreover, a significant and moderately positive correlation was

observed between the knowledge-skill sub-dimension of the care behavior scale and both the overall and sub-dimension scores of the patient-centered care competency scale, suggesting that nurses' theoretical knowledge and practical skills are closely linked to their ability to provide patient-centered care. These results are consistent with previous studies: Huang et al. (2018) reported that hospital nurses who worked overtime experienced higher levels of emotional exhaustion, depersonalization, and lower personal accomplishment, indicating the impact of work conditions on care quality (29). Similarly, Karlou et al. (2018) found a moderate positive relationship between nurses' care behaviors and patient-centered care sub-dimensions among nurses caring for patients undergoing chemotherapy in Greece (30). By demonstrating these associations, the current study contributes to the literature by emphasizing that both professional experience and skill development are key determinants of effective patient-centered care, highlighting the need for structured support and ongoing professional development programs for nurses.

In this study, nurses who reported enjoying their profession had statistically significantly higher patient-centered care competency scores compared to those who did not. This finding underscores the impact of job satisfaction on the quality of care behaviors and the ability to provide patient-centered care. Consistent with this, Janerka, Leslie, and Gill (2023) found a positive relationship between individualized care and nurses' overall job satisfaction, emotional exhaustion, and personal achievement in acute hospital settings. Their study demonstrated that higher job satisfaction and a sense of personal accomplishment positively influenced the level of care provided by nurses (31). These results reinforce the importance of fostering professional satisfaction and motivation among nurses as a means to enhance patient-centered care, highlighting the potential benefit of organizational strategies that support nurses' engagement and well-being.

Examining the literature, it has been emphasized that nurses' care competency levels and care behaviors are critical for ensuring patient safety and maintaining the quality of healthcare systems (31). High levels of theoretical knowledge, practical skills, and quality of care among nurses have been shown to significantly influence patient and elderly morbidity and mortality rates (32). In the current study, nurses who voluntarily chose to work in their respective fields had statistically significantly higher patient-centered care competency scores compared to those who did not work voluntarily. This finding aligns with the study by Adam et al. (2017), which reported that nurses who voluntarily selected their units achieved higher scores in the quality of care perceived by cancer patients than those who did not voluntarily work in their assigned units (33). These results highlight the importance of voluntary engagement and professional motivation in enhancing nurses' care competencies and ultimately improving patient outcomes.

The results of the study suggest that institutional adoption of approaches such as patient-centered care competence and care behaviors—both considered quality fields in their own right—will contribute to patient and family satisfaction by incorporating a shared decision-making process. This, in turn, is expected to provide the organization with a continuously evolving competitive advantage and contribute to the overall development of healthcare.

5. Conclusion and Recommendations

In our study, it was determined that nurses' patient-centered care competence was at a high level and their care behaviors were high. Additionally, it was determined that there was a statistically strong positive relationship between nurses' patient-centered care competence and care behaviors.

In line with these results;

- In this regard, studies should be carried out on a more comprehensive sample group,
- Conducting studies evaluating the effects of different variables affecting the care of elderly individuals receiving home health services will make significant contributions to the literature,

- Institutions providing home health services should establish preventive/therapeutic service policies that include quality, effective and comprehensive nursing care as well as patient-centered care competence,
- Individuals other than health professionals should not take part in the home health care unit,
- It is recommended that nurses providing home health services be given comprehensive in-service training on patient-centered care competence and care behaviors in a planned manner.

Limitations

This study is limited to nurses providing Home Health Care Services in the district municipalities of the Turkish Republic of Northern Cyprus. The results cannot be generalised to other personnel.

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Nursing Care in Acute Renal Failure After the Diagnosis of Congestive Heart Failure According to Gordon's Functional Health Patterns Model: A Case Report

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Abstract: Congestive heart failure; it is characterized by the inability of the heart to pump blood to the periphery that cannot meet its metabolic needs. Increases in the workload of the heart occur due to deterioration of myocardial performance, dysrhythmias and filling defect in the heart. Complaints seen in congestive heart failure; shortness of breath, weakness, edema in the feet and legs, and cough. In the case, a 66-year-old female patient was admitted to the hospital with the complaint of shortness of breath. As a result of the examinations, she was diagnosed with congestive heart failure and admitted to the ward. In this process, the patient was evaluated according to the Functional Health Patterns Nursing Model and nursing care was given.

Keywords: Nursing, Nursing Care, Health

1. Introduction

Congestive heart failure (CHF); it is a complex clinical syndrome with symptoms such as shortness of breath, ankle edema and fatigue, increased jugular venous pressure, pulmonary rales, and peripheral edema, which occur as a result of a structural or functional defect in the filling of blood into the ventricle or decrease in the ejection fraction (EF) of the heart (1).

Symptoms are generally shortness of breath, fatigue, chest pain, edema of the hands and feet, sleep problems and dizziness (2). Individuals with a diagnosis of heart failure need long-term care because of their chronic disease and high mortality risk. In this context, the main principles of treatment; salt restriction, fluid intake/restriction, weight control, smoking and alcohol use, physical activity, protection and immunization against diseases, compliance with medical treatment (1). CHF care purposes in terms of nursing; to relieve anxiety and fatigue symptoms of individuals, to remove excess fluid volume, to increase exercise tolerance, to encourage physical activity, to evaluate the results of pharmacological treatment, to prevent complications, to detect signs and symptoms in the early period, patient and family education (3).

1.1. Case information

Ethical aspects: This case study is discussed according to Gordon's functional health patterns model. Verbal and written consent was obtained from the patient for the conduct of this case article within the framework of the principles of the Declaration of Helsinki.

Sociodemographic characteristics: H.T. is a 66-year-old female patient and retired. She started to live with her sister after the death of her husband and son.

1.2. Health history

Past health history: Chronic diseases diagnosed by H.T. 15 years ago are Diabetes Mellitus (DM) and Hypertension (HT). There is no history of alcohol and smoking, known drug or food allergies. H.T. also underwent prosthetic surgery on her right knee 20 years ago.

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Drugs used: “Rocephin Injection 1gr 1x1 (IV), Beloc Zoc 50mg 1x1 (tb), Ecoprin 100mg 1x1 (tb), Plavix 75mg 1x1 (tb), Panto 40mg 1x1 (tb), Ator 40mg 1x1 (tb), Sutril Neo 10mg 1x1 (tb), Forziga™ 10mg 1x1 (tb), Norvasc® 10mg 1x1 (tb-As Needed (LH)), Hydration, Dopamine Perfusion, Lasix Perfusion, Potassium Perfusion and Zofer 4mg (IV).

Current health history: H.T. who had a known diagnosis of hypertension and DM, applied to a training and research hospital on 17 March 2022 with the complaint of shortness of breath. Ejection fraction (EF) was found to be 30% in the examinations and echocardiography (ECHO) and a diagnosis of CHF was made. H.T. was admitted to the service of the institution for medical treatment. Nephrology consultation was requested when creatinine values increased while she was lying in the service on 18-19-20 March 2022, her intake-output balance (IOB) was +1450cc, and the urine amount was 300 ml in 24 hours. Adding Sutril Neo 10mg and Forziga 10mg to the treatment plan of the physician who came for consultation resulted in an increase in creatinine (3.55 mg/dL) and a decrease in sodium (128 mmol/L). H.T., was hospitalized in the coronary intensive care unit for follow-up and follow-up with the diagnosis of acute renal failure.

Medical diagnoses: Congestive Heart Failure, Acute Renal Failure (ARF), Hypertension and Diabetes Mellitus.

2. Functional Health Patterns and Case Evaluation

2.1. Health perception – health management pattern

H.T. described her health as moderate. She stated that since her father passed away due to coronary artery disease (CAD), she regularly came for checkups. H.T. stated that she walks 1.5-2 hours a day in her normal life. H.T. was found to be overweight with a body mass index (BMI) of 28.73 kg/m². H.T. was evaluated and maintained on 22-23 March 2022. On the first day of her evaluation, she stated that she had pain due to the vascular access in her left arm. H.T. gave a score of 3 out of 10 for the degree of pain according to the visual analog scale (VAS). However, she stated that her pain subsided after the relocation of the vascular access and the vascular access dressing.

2.2. Nutritional-metabolic pattern

H.T. is fed 3 meals a day. However, it was observed that she only took a salt-free diet and did not have a diet suitable for DM. Oral intake of HT was found to be +600 cc in the last two days. In terms of the oral assessment guide (OAG), it was determined that the lips were dry and cracked, there was a dirty yellow layer on the upper layer of the tongue, and the OAG score was 11 due to the thick and sticky consistency of the saliva (OAG score ranges from 8-24). Oral care frequency is planned as 3x1 if OAG score is 8, 6x1 if 9-19 points, and 12x1 if 20 points and above). When examined in terms of skin, vital signs were evaluated in the morning and evening, and no distress was observed in terms of body temperature. In the evaluation of edema, the degree of edema was +2 on both days. Within the scope of diabetic foot examination, foot health, neuropathy, immunopathy, deformities, pain, presence of infection were evaluated. It was observed that there were deep cracks in the feet of H.T. She stated that she did not follow the doctor's recommendations for not wearing shoes. The nursing care plan of the nutritional and metabolic status pattern of H.T. is explained in Table 1.

2.3. Elimination pattern

Bowel sounds of H.T. were evaluated and it was observed to be 6 per minute. It was determined that HT performed bowel evacuation 3-4 times a week during her hospitalization. According to the physician's request, she takes Sutril Neo as diuretic treatment and Lasix perfusion as IV. The patient is evacuated with a foley catheter, and a 2-hour balance is followed due to ARF.

2.4. Activity-exercise pattern

Stating that she wanted help in her daily living activities (ADL), mostly in her self-care needs, H.T. stated that she could not take a bath for 2 weeks. H.T. stated that she could not both walk and talk in her daily life and that she often experienced dyspnea. When the joint patency (ROM) is evaluated, she has partial limitation due to the vascular access in her left arm. On the days of evaluation, the respiratory rate was generally measured as 16 per minute. When HT was asked about the degree of dyspnea according to VAS, she stated that it was 5, and as the oxygen saturation decreased to the range of 75-80%, oxygen inhalation treatment was started at 2lt/min with the help of a nasal cannula upon the physician's request. In the 2-hour follow-up, radial pulses and blood pressure were monitored with the cuff on the right arm while sitting, and it was between 107/48 mmHg and 140/72 mmHg in the morning and evening follow-ups. When the pulse was evaluated with palpation, the dorsalis pedis was felt weak. First degree AV block was observed on ECG and S3-S4 heart sounds were heard in heart sounds. It was determined that the capillary refill time was prolonged and there were returns in 3-4 seconds.

The nursing care plan of the activity-exercise pattern of H.T. is explained in Table 2.

2.5. Sleep-rest pattern

Expressing that she could not wake up rested in the morning, H.T. stated that she often woke up at night because of the groaning or snoring of other patients. In addition, it was observed that she took a nap 2-3 times after lunch due to frequent urination at night. H.T. stated that she had sleep apnea that had been going on for several months in his daily life, and that was why she woke up at night.

The nursing care plan for the sleep and rest pattern of H.T. is explained in Table 3.

2.6. Cognitive-perceptual pattern

It was not observed that the patient had any disturbance of consciousness or orientation problem on the days of evaluation. However, as time passed, she stated that she wanted to get out of the hospital frequently and that she was very overwhelmed.

The nursing care plan of the cognitive-perceptual state pattern of H.T. is explained in Table 4.

2.7. Self perception- self concept pattern

It was observed that H.T. was generally calm but hopeless due to the prolonged hospital stay. Statements such as "I will use more drugs", "I do not want to leave my sister alone" show that the individual is worried. **[Nursing diagnosis: hopelessness (see)]**

2.8. Role- relationship pattern

After losing her husband and son, H.T. stated that she started living with her sister and that her sister had a partial disability while walking. She plays the role of elder sister and caregiver.

2.9. Sexuality-reproductive pattern

In general, H.T. tried to change the subject when questions about sexuality were attempted to be moderated.

2.10. Coping-stress-tolerance pattern

While H.T.'s positive thoughts were that she was well cared for in the hospital, her negative thoughts were that she had new diagnoses and could not take care of her sister. **[Nursing diagnosis: hopelessness (see)]**

2.11. Value-belief pattern

Expressing that she is satisfied with her life, H.T. stated that she prayed to go to her sister's.

3. Discussion

Cardiogenic shock, acute pulmonary edema, myocardial infarction, dysrhythmia, thromboembolism, kidney and liver failure, anemia, and thyroid gland disorders are among the complications that can be seen in individuals diagnosed with congestive heart failure (4). It was found that ARF developed in H.T. due to the increase in serum creatinine level after the diagnosis of CHF, the presence of hypertension, and the presence of ACT values of +1450cc. Diagnoses of hypertension, DM and ARF require attention to nutritional status. Nutrition is important in controlling CHF and in the management of comorbid diseases. It is important in terms of nursing care that fluid consumption is not excessive, nutrition with unsaturated fats, balance monitoring and weight monitoring are important (5). Edema, one of the main findings of CHF, occurs as a result of diffuse fluid retention. The degree of edema was detected at +2 level of H.T. This is due to increased oral intake and less urine output. For this reason, the hands and feet of the individual were raised. Electrolyte values were checked regularly. Studies have shown that the sympathetic nervous system and renin angiotensin aldosterone system are suppressed while lying down, thus facilitating the removal of edema from the body, and bed rest also plays an important role (6). For this reason, bed rest is included in the treatment of edema in H.T. In case of edema in individuals with a diagnosis of CHF, hypertension should be controlled as a result of increased hydrostatic pressure; Since vitamin D deficiency, decreased functional capacity, inflammation and ventricular hypertrophy will exacerbate CHF, daily mineral and vitamin supplements should be made; Weight gain due to fluid accumulation or weight loss can be achieved with treatment (6). For this reason, daily weight monitoring should also be done. In addition, the patient has a high risk of developing bedsores due to the presence of edema, limitation of movement, and malnutrition. Therefore, in order to protect the skin integrity of the patient, regular skin care, adequate and balanced nutrition, position change in the form of left lateral, back and right lateral every 2 hours should be provided and frequent monitoring should be performed in terms of edema and skin integrity (7,8).

Oral health is important in individuals with cardiovascular disease. Risk of cardiovascular disease in individuals with poor oral hygiene It is stated that improvements in poor oral hygiene in patients with CHF will positively affect the systemic and hemodynamic status of the individual (9). Oral evaluation and oral care of the case were performed routinely. The patient was also informed about the importance of oral care.

Studies have shown that diaphragmatic breathing exercise strengthens respiratory muscles, increases endurance, increases ventilation and tissue oxygenation, reduces dyspnea, and increases exercise tolerance (10). Since H.T. has dyspnea, diaphragmatic breathing exercise was taught and applied in order to improve lung ventilation and relieve breathing, and it helped the individual in the management of dyspnea (11). When the oxygen saturation of H.T. decreased to 75%, oxygen therapy was started with a nasal cannula at 2lt/min upon the physician's request. It was determined that dyspnea complaint decreased and oxygen saturation increased to 95% after the treatment.

Advanced age, changes in respiratory pattern, decrease in physical activity, drug use and emotional states cause sleep problems in heart failure patients. It has been observed that the disease affects the prognosis negatively in individuals diagnosed with CHF with sleep problems (12). In this context, it was observed that interventions such as adjusting the treatment plans according to sleep hours, placing the appropriate position, turning off the lights at the head end were effective in ensuring the sleep pattern of the patient.

Studies have shown that individuals with a diagnosis of CHF experience hopelessness for the future or due to the disease. It has been explained that the reasons such as the prolongation of the diagnosis period of individuals with a diagnosis of CHF, such as HT, and the high number of comorbid diseases increase the burden of care (13). In chronic diseases such as CHF, life style changes, not having the necessary skills, loss of control in life, and not knowing what to do in stressful situations may cause

difficulties for the caregivers (14). In this context, H.T.'s concerns are understandable. In addition, the development of problem-solving skills to cope with problems such as deterioration in physical capacity as a result of the progression of heart failure and shortness of breath, fatigue, loss of muscle strength, dietary restrictions and gait disturbance, unemployment, poor economic situation, long hospitalizations, and the use of multiple drugs, lowers hopelessness (15). In our case, the fact that she was hospitalized in the intensive care unit, the complications caused by the disease, and new treatment attempts increased the sense of hopelessness. For this reason, it is important to monitor the individual in terms of depressive symptoms, to communicate frequently, and to teach coping methods about the disease (15).

Table 1. Nursing Care Plan by Nutrition and Metabolic Status Pattern

1.Nursing diagnosis: Risk of Oral Mucous Membrane Disruption (NANDA Area 11: Safety/Protection, Class 2: Physical Injury) Expected result: To maintain the integrity of the oral mucous membrane, to maintain the necessary humidity and to ensure oral hygiene. Interventions: Oral care in daily life of H.T. will be questioned; Oral evaluation will be done daily. At the physician's request, oxygen therapy will be started with the help of a nasal cannula at 2 lt/min, and then oral care will be applied. Oxygen delivery through the nasal cannula is applied as a result of the decrease in oxygen saturation. Nasal cannula is preferred because it is comfortable to use and less affected by movement. In addition, since the increase in oxygen flow rate may cause dryness in the mucous membrane, it should be planned to apply moisturizer and oral care afterwards (16) (Lewis et al., 2019). Evaluation: H.T. stated that she does not attach much importance to oral hygiene in her daily life, and that she pays attention to brushing teeth at least once a day. Since OAG was evaluated as 11 points, the frequency of oral care was calculated as 6x1. Oral care was given in cooperation with the patient after nasal oxygen therapy given at the request of the physician. As a result of the oral care applied in this context, no change was observed in the OAG score during the days the patient was followed.
2.Nursing diagnosis: Fluid Volume Excess (NANDA Domain 2: Nutrition, Class 5: Hydration) Expected result: Balancing the amount of intake and output, reducing edema, absence of signs of excess fluid. Interventions: Oral intake will be restricted at the physician's request, and diuretic use will be started. The balance that it takes for 2 hours will be tracked. By attaching a Foley catheter, the color and amount of urine will be monitored. Daily edema, weight and blood pressure will be monitored. Laboratory findings will be followed regularly. Symptoms of hyponatremia (weakness, nausea-vomiting, decrease in sodium) and hypokalemia (ECG changes, decrease in blood pressure) will be evaluated. Hands and legs will be elevated to reduce edema. Attention will be paid to skin integrity to prevent bedsores (6). Evaluation: After the oral intake was restricted at the request of the physician, the urine amount was observed as “-100 ml” in the 2-hour balance follow-up. After insertion of the Foley catheter, urine color did not change, but the amount of urine increased over time. Potassium chloride perfusion was started upon the physician's request, due to decreased potassium values in laboratory findings (March 22: 4.16 mEq/L; March 23: 4.23 mEq/L). Her ECG was followed as first-degree AV Block throughout the entire process. On both days, peripheral edema examination was +2, and elevation was achieved in the hands and feet. There was no change in the degree of edema, and the follow-up was continued. Attempts were made to preserve skin integrity (See Nursing Diagnosis 3: Deterioration of Skin Integrity).

Tablo 1 (Continued)

3.Nursing diagnosis: Deterioration of Skin Integrity (NANDA Area 11: Security/Protection, Class 2: Physical Injury)

Expected result: Maintaining skin integrity, absence of redness, edema, bleeding at intravenous (IV) catheter and pressure sites.

Interventions: Bed linen will be clean, wrinkle-free and dry. Pressure zones (perineum, sacrum, head and back of the ear, shoulder heads and elbows, heels) will be evaluated at each position change (7). The skin will be kept dry and clean to avoid pressure sores; position changes will be made regularly at intervals of two hours; nutritional status of the individual will be evaluated; balance will be followed (8). Although edema occurs due to fluid retention in CHF, daily edema will be followed up (dyspnea level and edema in the lower extremities (6). If necessary, an air mattress will be used. Every day, the vascular access area will be evaluated for deterioration in skin integrity. Diabetic foot care will be provided and training will be given on the importance of diabetic foot care.

Evaluation: The individual was given a full body bath and perineal care. After the maintenance, the mattress was changed to an air mattress, and the bedding was changed to ensure that it was dry and wrinkle-free. A position change was applied every 2 hours against decubitus formation. Her position in the bed was supported by placing a pillow under her right and left arms and between her legs. Edema evaluation was observed as +2 on both days. Due to the ecchymosis on her left arm, wet dressing was applied with Eau de Goulend every day. Diabetic foot care was demonstrated and training was given.

4.Nursing diagnosis: Nutrition More Than Body Requirements (NANDA Domain 2: Nutrition, Class 1: Eating)

Expected result: To ensure that H.T. is fed as much as the body needs, nutrition in accordance with chronic diseases and weight control.

Interventions: Daily weight monitoring will be done and BMI will be evaluated. An exercise program will be determined to help with weight loss as it includes continuous and regular muscle movements, which have positive effects in all age groups. Education about diabetic nutrition will be given and the individual will be encouraged to practice. She will be provided with liquids and soft foods to prevent nausea. Fasting blood sugar will be measured regularly before meals and at regular intervals in order to determine the individual's insulin needs. Nutritional status during the day will be monitored.

Evaluation: Her BMI value was calculated as 28.73 kg/m² and she was found to be overweight. Education was planned and applied to the individual who had a lack of knowledge about diabetic nutrition. H.T. was fed in accordance with hospital hours. Due to the nausea during the day, she was allowed to consume liquid and soft foods. Fasting blood sugar was monitored between 128 mg/dL and 162 mg/dL.

5.Nursing diagnosis: Lack of Knowledge-Diabetic Foot Care- (NANDA Domain 5: Perceptual/Cognitive, Class 4: Cognitive)

Expected result: To inform about diabetic foot care and to enable them to apply it on their own.

Interventions: Knowledge level about diabetic foot care will be questioned. Diabetes foot care, which is an important complication in individuals with diabetes mellitus, will be demonstrated in practice and the effectiveness of the training will be evaluated. It will be talked about the issues that should be considered in wearing shoes and choosing shoes. Situations in which a doctor should be consulted will be explained.

Evaluation: The patient's knowledge level about diabetic foot care was questioned and an appropriate training was planned and demonstrated according to her needs.

Table 2. Nursing Care Plan by Activity-Exercise Pattern

1.Nursing diagnosis: Decrease in Cardiac Output (NANDA Area 4: Activity/Rest, Class 4: Cardiovascular/Pulmonary Responses) Expected result: To prevent complications, to reduce edema, to provide relief for the individual in terms of breathing. Interventions: It will be monitored to monitor H.T.'s rhythm regularly. Vital signs will be evaluated hourly. Lung and heart sounds will be listened to. With head-to-toe palpation, pulses will be evaluated for fullness, speed, and abnormal rhythm. It will be avoid Valsalva maneuvers. By reducing the workload of the heart, the individual will be placed on absolute bed rest. Oxygen saturation will be monitored due to dyspnea complaint in H.T. and, if necessary, oxygen therapy will be initiated upon physician's request. The skin will be evaluated for moisture and pallor. Capillary refill will be evaluated in terms of tissue perfusion. Evaluation: Lung and heart sounds of H.T. were listened, pulses were evaluated from head to toe, and no change was observed in symptoms (+2 edema, first degree AV Block on ECG, prolonged capillary refill time, dyspnea, S₃-S₄ heart sound, 30% EF). At the request of the physician, oxygen therapy was started at 2lt/min through the nasal cannula and the semi-fowler position was given. The patient's oxygen saturation increased to 95% under 2 lt/min oxygen inhalation, the complaint of dyspnea decreased, and the treatment was terminated after approximately 2 hours of oxygen therapy. H.T. was continued to be monitored, oxygen saturation continued between 95% and 100%.
2.Nursing diagnosis: Activity Intolerance (NANDA Domain 4: Activity/Rest, Class 4: Cardiovascular/Pulmonary Responses) Expected result: To ensure that the activity is carried out without dyspnea or cyanosis, to know and report the negative symptoms of the exercise. Interventions: Conditions that increase or decrease dyspnea will be questioned. A semi-fowler position will be placed in the bed and dyspnea will be evaluated in this position. Oxygen therapy will be administered according to the physician's request before, during and after the activity. ECG will be taken in terms of arrhythmia and it will be continuously evaluated by monitoring. If she complains of pulse irregularity, chest or leg pain, extreme weakness, and dyspnea during the activity, it will be stated that she should terminate the activity. ROM (range of motion-joint restriction) exercises will be done in the bed. Breathing exercises regulate cardiac parameters such as respiration, ejection fraction, aortic pressure, pulmonary artery pressure and tissue oxygenation. Diaphragmatic breathing, on the other hand, especially improves lung ventilation and is thus used to control breathing (11). For this reason, breathing will be discussed and diaphragmatic breathing training will be given if necessary. Evaluation: H.T.'s complaint of dyspnea was questioned, and it was found that she had difficulty in breathing during activity and that she often woke up at night. She gave 5 points (1 with at least 10 very high points) when questioned about dyspnea. At the physician's request, oxygen therapy was started with a nasal cannula at 2 lt/min. After the treatment, the oxygen saturation increased from 75% to 95% and the complaint of dyspnea decreased. Diaphragmatic breathing exercise training was given because it reduced dyspnea and increased exercise tolerance. The patient continued to be followed. No change was observed in the EKG. During and after in-bed exercises, when there were conditions such as leg pain and pulse irregularity, the exercise was terminated and information was given to pay attention to these in daily life. The patient was provided with diaphragmatic breathing training.

Table 3. Nursing Care Plan According to Sleep-Rest Pattern

1.Nursing diagnosis: Sleep Pattern Disturbance (NANDA Domain 4: Activity/Rest, Class 1: Sleep/Rest)

Expected result: To wake up rested as a result of the improvement in the sleep pattern.

Interventions: Individuals with a diagnosis of CHF experience sleep problems due to various reasons such as not being able to breathe easily, coughing and snoring, and pain. For this reason, it is important to detect this problem and take precautions in the early period (12). In this context, treatment hours will be adjusted according to sleep patterns. The state of hopelessness will be tried to be reduced. ROM exercises will be done in bed during the day. It will be ensured that she does not nap during the day. If the individual has anxiety, relieving interventions will be planned. If the individual's condition is stable, she will not be awakened at night to check her vital signs. Sleep routine and habits will be questioned.

Evaluation: The latest treatment time of the patient was set as 22:00. Sleep routine and habits were questioned; She stated that she wakes up early in the morning and if she can't sleep, she does handwork. It was tried to chat and do in-bed exercises so that she would not sleep during the day. The patient did not wake up to urinate because a Foley catheter was inserted, so her sleep was not interrupted. Expressing that she slept less during the day, H.T. stated that she was less tired the next day.

Table 4. Nursing Care Plan According to Cognitive-Perceptual Status Pattern

1.Nursing diagnosis: Hopelessness (NANDA Domain 6: Self-Perception, Class 1: Self-Concept)

Expected result: To enable the individual to cope with their hopeless thoughts and to eliminate their hopeless thoughts as much as possible.

Interventions: Frequent contact will be made with the individual. Methods of coping with hopeless situations will be questioned. Information gaps will be corrected. she will be allowed to meet or talk to her sister. If appropriate, the same nurse will be involved. Individuals will be allowed to participate in their own care. Appropriate positions will be given to the individual, her privacy will be taken care of and a quiet and comfortable environment will be provided.

Evaluation: Education (diabetic foot, diabetic nutrition and diaphragmatic breathing training) was given to the patient who was observed to have deficiencies in knowledge. There was talk about why she needed to stay in the hospital. All maintenance and applications were made with the participation of H.T. She was allowed to talk to her sister on the phone. Thus, learning that her sister is in good condition and chatting made it enjoyable for H.T. She was given a position every 2 hours and her privacy was protected by closing the curtains during each application since she was in the intensive care environment.

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