

The Relationship Between Nutrition Literacy and Diet Self-Efficacy in Individuals who Have Cardiovascular Disease or Cardiovascular Risk Factors Receiving Dietary Therapy

Kübra Kazak¹ , Binnur Okan Bakır² 

¹Özel Salihli Can Hastanesi, Beslenme ve Diyet Kliniği, Salihli, Manisa

²Yeditepe University, Department of Nutrition and Dietetics, İstanbul, Turkey

Kübra KAZAK
Binnur OKAN BAKIR

ABSTRACT

Purpose: We aimed to determine the nutrition literacy and diet self-efficacy levels of individuals who have a cardiovascular disease or risk factors and receive medical nutrition therapy, and to determine the effect of nutrition literacy on diet self-efficacy.

Methods: A total number of 150 participants were included in the study between November 2019 and February 2020. Their height, body weight, and waist circumference were measured, age, gender, educational levels, place of residence were questioned, and "Nutrition Literacy Assessment Tool in Adults" and "Self-Efficacy Scale in the Regulation Nutritional Habits in Cardiac Patients" were used for data collection.

Results: A significant difference was found between the educational levels of the participants, their place of residence, and their nutrition literacy levels ($p<0.05$). The nutrition literacy levels of all participants were determined to be "borderline". All individuals participating in the study were found to have low diet self-efficacy levels. A very significant positive correlation was found between diet self-efficacy levels and nutrition literacy levels and components of nutrition literacy among the individuals participating in the study ($p<0.05$).

Conclusion: Dietary therapy and nutrition education plays an important role in individuals with cardiovascular disease and risk factors. Nutrition education for these individuals may be beneficial by also considering their nutrition literacy and diet self-efficacy levels.

Keywords: Nutrition Literacy; Self-Efficacy; Cardiovascular Disease

Kardiyovasküler Hastalık veya Kardiyovasküler Risk Faktörlerine Sahip ve Tıbbi Beslenme Tedavisi Alan Bireylerde Beslenme Okuryazarlığı ve Diyet Öz Yeterliliği

ÖZET

Amaç: Bu çalışmada kardiyovasküler hastalığa veya risk faktörlerine sahip olup, tıbbi beslenme tedavisi alan bireylerde beslenme okuryazarlığı ve diyet öz yeterliliğinin saptanması, beslenme okuryazarlığının diyet öz yeterliliğine etkisinin değerlendirilmesi amaçlanmıştır.

Yöntem: Çalışmaya Kasım 2019 – Şubat 2020 tarihleri arasında 150 birey dahil edilmiş, boy uzunluğu, vücut ağırlığı ve bel çevreleri ölçümleri yapılmış, veri toplamak için sorgulanan yaş, cinsiyet, eğitim durumu, yaşanılan bölge gibi sosyodemografik özelliklerine ek olarak Yetişkinlerde Beslenme Okuryazarlığı Değerlendirme Aracı ve kalp hastalarında beslenme alışkanlıklarının düzenlenmesinde Öz Yeterlilik Ölçeği kullanılmıştır.

Bulgular: Bireylerin eğitim seviyesi ve yaşadıkları bölge ile beslenme okuryazarlığı arasında anlamlı bir ilişki olduğu ($p<0.05$), tüm katılımcıların beslenme okuryazarlığının sınırdaki olduğu saptanmıştır. Diyet öz yeterliliğinin tüm katılımcılarda düşük olduğu bulunmuştur. Diyet öz yeterliliği ile beslenme okuryazarlık seviyesi ve beslenme okuryazarlığı bileşenleri anlamlı derecede pozitif korelasyon göstermiştir ($p<0.05$).

Sonuç: Tıbbi beslenme tedavisi ve beslenme eğitimi kardiyovasküler hastalığa veya risk faktörlerine sahip olan bireyler için önemli bir rol oynamaktadır. Bu bireyler için beslenme eğitiminin beslenme okuryazarlığı ve diyet öz yeterliliğinin de kapsayacak şekilde planlanmasının faydalı olacağı düşünülmektedir.

Anahtar Kelimeler: Beslenme Okuryazarlığı, Öz Yeterlilik, Kardiyovasküler Hastalıklar

Correspondence: Binnur Okan Bakır
Yeditepe University, Department of Nutrition and Dietetics, İstanbul, Turkey
Phone: XXX
E-mail: binnur.bakir@yeditepe.edu.tr

Received: 4 January 2022

Accepted: 19 March 2022

Cardiovascular disease (CVD) and risk factors are health problems that can be prevented by a healthy diet and lifestyle modifications, or that can be treated with medical therapy, medical nutritional therapy, and lifestyle modifications (1). One of the most effective factors for successful nutritional therapy is nutrition literacy, thus successful nutritional therapy is related to nutrition literacy level (2). Nutrition education plays an important role in both the prevention and treatment of increasing chronic diseases (especially cardiovascular diseases and their risk factors). However, nutritional knowledge is complex and may require high levels of cognitive skills (2,3). Self-efficacy is a considerable factor for both medical nutrition therapy and lifestyle changes, and diet self-efficacy is a factor that shows individuals' trust that they will adhere to their nutrition programs (4). Although nutrition has a critical preventive and therapeutic role in CVDs, which have been the primary cause of death worldwide for years, the number of studies on nutrition literacy and dietary self-efficacy is limited (5).

We aimed to determine the nutrition literacy and dietary self-efficacy levels of individuals who have a cardiovascular disease or risk factors and receive medical nutrition therapy (MNT), and to determine the effect of nutrition literacy on dietary self-efficacy levels, thus promoting the development of effective nutrition interventions for individuals with CVD and risk factors.

MATERIALS AND METHODS

Participants

The sample size of the study was calculated as 138 with a 95% confidence interval, by predicting a 0.3-level correlation between the "Nutrition Literacy Assessment Tool in Adults (NLATA) and the Self-Efficacy Scale". Between November 2019 and February 2020 all individuals who applied to the diet policlinic of a public city hospital and complied with the inclusion criteria were included in the study. Inclusion criteria were being a volunteer; diagnosed with cardiovascular disease or cardiovascular risk factors including hypertension, hyperlipidemia, dyslipidemia, hypercholesterolemia, and receiving medical nutrition therapy; being between 18-65 years of age, and being literate. Thus, we included 150 participants who met the inclusion criteria and approved the written informed consent form.

Data Collection

This study included two scales: "Nutrition Literacy Assessment Tool in Adults" and "The Self-Efficacy Scale in the Regulation of Nutritional Habits in Heart Patients"; additionally, a data collection form in which

sociodemographic characteristics and anthropometric measurements were documented.

Nutrition Literacy Assessment Tool in Adults evaluating the health and nutrition literacy assessment tools was developed by Cesur, in 2015. It has consisted of 5 parts: (a) general nutrition information section; (b) reading comprehension section; (c) food groups section; (d) portion quantities section; (e) numeracy literacy and food label reading section. The total score is determined by summing the scores from the sub-sections. The highest score that can be obtained is 35. The evaluation of the total score is as follows: 0-11 points are defined as insufficient; 12-23 points borderline; 24-35 points based on sufficient nutrition literacy level (6).

The Turkish validity reliability of the "Self-Efficacy Scale in the Regulation of Nutritional Habits in Cardiac Patients" developed by Bandura (7) was made by Argon and Sevinç in 2010 (8). The Self-Efficacy Scale in the Regulation of Nutritional Habits in Cardiac Patients determines the self-rating of the participants for their performance in the regular nutritional routine. The participants determine the scoring from 0 (not possible) to 50 (can be done at the intermediate level) and 100 (can be done precisely) at intervals of 10 units, depending on the strength of their efficacy beliefs. As the total score obtained from the scale increases, the self-efficacy of the individual is high, and the lower the self-efficacy as it decreases (8).

Anthropometric measurements of the participants were taken by the researcher. Body weight measurement of the participants was measured with a weight-sensitive scale (Health O Meter Professional – 599 KL) of 0.1 kg taking care to dress as thinly as possible. The height of the participants was measured with a stadiometer while the individual was in an upright position, while Frankfurt was standing in the plane (the ear canal and the lower border of the orbital-eye socket, the gaze was parallel to the ground), with a sensitivity of 0.1 cm. Measurement of waist circumference of the participants was made by measuring the perimeter between the lower rib and iliac bone with the inelastic tape measure based on the recommendation of the World Health Organization (2000). Body mass index (BMI) was calculated by dividing body weight by square meter of height [body weight (kg)/height (m)]. The participants were classified as underweight, normal body weight, overweight, class I obesity, class II obesity, and class III obesity according to their BMI values as: below 18.5 kg/m² between 18.5-24.9 kg/m² 25.0-29.9 kg/m² 30.0-34.9

kg/m² 35.0-39.9 kg/m² and above 40 kg/m² respectively. The waist circumference of the participants was classified as <88 cm or ≥ 88 cm for women and <102 cm or ≥ 102 cm for men regarding the disease risk (9).

Statistical Analysis

Statistical evaluation was performed with IBM Corp. Released 2010. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp. After the appropriateness of the measurable data to normal distribution was examined by the Shapiro Wilk test, for those with normal distribution, t-test and variance analysis were used in the independent group, Mann Whitney U test and Kruskal Wallis variance analysis were used to evaluate data that did not conform to the normal distribution. The Pearson or Spearman correlation analysis for appropriate was used to examine the relationships between the variables. One of the chi-square tests suitable for qualitative data was used. Median (min-max) values and arithmetic mean ± standard deviation and numbers and percentages were given as descriptive statistics. For all statistics, p-value <0.05 was accepted as significant.

RESULTS

The total number of women participants was 109 (72.66 %) and 41 of the participants were men. The mean age of women and men participants was 52.56±8.86 and 56.00±6.55 years, respectively. The mean BMI of women and men was 36.93±6.23 kg/m² and 33.39±5.21 kg/m², respectively and 37.30 % of total participants were class I. obese and 28.70 % were class II. obese.

The total score of the Nutrition Literacy Assessment Tool in Adults (NLATA) was 20.31±7.62 (borderline) and 20.56±7.41 (borderline) among women and men, respectively. Nutrition Literacy Assessment Tool (NLATA) classification and its relationship with educational status, age, place of residence, and medical nutrition therapy interview frequency by gender are given in Table 1.

Table 1. Nutrition Literacy Assessment Tool (NLATA) Classification and Its Relationship with Educational Status, Age, Place of Residence and Medical Nutrition Therapy Interview Frequency by Gender

	NLATA TOTAL SCORE CLASSIFICATION													
	Women (n=109)							Men (n=41)						
	Insufficient		Borderline		Sufficient		x ² p	Insufficient		Borderline		Sufficient		x ² p
	n	%	n	%	n	%		n	%	n	%	n	%	
Educational Status														
Primary school	11	19.30	39	68.40	7	12.30	x ² =42.769 p=0.000*	4	23.50	11	64.70	2	11.80	x ² =14.596 p=0.024*
Secondary school	3	23.10	6	46.20	4	30.80		1	14.30	4	57.10	2	28.60	
High school	1	4.30	4	17.40	18	78.30		1	8.30	5	41.70	6	50.00	
Undergraduate and above	0	0.00	4	25.00	12	75.00		0	0.00	0	0.00	5	100.00	
Age (year)														
18-24	0	0.00	1	50.00	1	50.00	x ² =18.314 p=0.019*	0	0.00	0	0.00	0	0.00	x ² =3.865 p=0.425
25-30	0	0.00	0	0.00	2	100.00		0	0.00	0	0.00	0	0.00	
31-37	0	0.00	0	0.00	3	100.00		0	0.00	1	100.00	0	0.00	
38-50	1	3.80	10	38.50	15	57.70		1	12.50	2	25.00	5	62.50	
51-64	14	18.40	42	55.30	20	26.30		5	15.60	17	53.10	10	31.30	
Place of Residence														
City	10	12.50	30	37.50	40	50.00	x ² =20.262 p=0.000*	4	17.40	6	26.10	13	56.50	x ² =11.495 p=0.003*
Rural	5	17.20	23	79.30	1	3.40		2	11.10	14	77.80	2	11.10	
Medical Nutrition Therapy Interview Frequency														
No	8	23.50	20	58.80	6	17.60	x ² =12.112 p=0.017*	4	23.50	7	41.20	6	35.30	x ² =2.282 p=0.684
1 time	4	10.30	20	51.30	15	38.50		2	10.50	10	52.60	7	36.80	
>1 time	3	8.30	13	36.10	20	55.60		0	0.00	3	60.00	2	40.00	
0-11 points: insufficient literacy level, 12-23 points: borderline literacy level, 24-35 points: sufficient literacy level. In-group analysis: chi-square test analysis. p * <0.05														

When the NLATA total score classification of the participants are evaluated by gender, a significant difference was found between the educational status, age, place of residence, and medical nutrition therapy interview frequency in women, and the educational status and place of residence in men and NLATA total scores ($p < 0.05$).

Regarding the nutrition literacy levels of women, age; body weight; BMI, and waist circumference were evaluated and only a significant difference was found in age ($p < 0.001$) while there was no significant difference for men ($p > 0.05$).

There was a significant negative correlation between the general nutritional knowledge, reading comprehension, numeracy literacy and food label reading sections score and nutrition literacy total scores, and age among women ($p < 0.01$). A significant positive correlation was found between the educational status and the scores obtained from all sections of NLATA and their total scores ($p < 0.001$). Between place of residence and all other department scores and total scores, except NLATA food groups and portion quantities, there was a significant negative correlation ($p < 0.001$).

Between the place of residence and portion quantities section scores, a significant negative correlation was found ($p < 0.05$).

NLATA scores of men showed that there was a significant positive correlation between general nutritional information, reading comprehension, numeracy literacy, food label reading sections scores and total scores, and educational status ($p < 0.01$). A significant negative correlation ($p < 0.05$) was found between the place of residence and all the scores of the sections except for the NLATA food groups section, and a significant negative correlation was found between the place of residence and the total score ($p < 0.01$). A significant negative correlation was found between the food groups section scores and waist circumference and BMI values ($p = 0.006$ and $p = 0.003$, respectively, $p < 0.01$).

The mean total scores of participants on the diet self-efficacy scale were 1434.87 ± 736.72 . The classification of the total scores of the Diet Self-Efficacy Scale (DSES) of the participants and its relationship with educational status, age, place of residence, and medical nutrition therapy interview frequency by gender are given in Table 2.

Table 2. Diet Self-Efficacy Scale Classification and Its Relationship with Educational Status, Age, Place of Residence and Medical Nutrition Therapy Interview Frequency by Gender

	DIET SELF-EFFICACY SCALE CLASSIFICATION									
	Women (n=109)					Men (n=41)				
	Low		High		χ^2 p	Low		High		χ^2 p
	n	%	n	%		n	%	n	%	
Educational Status										
Primary school	35	61.40	22	38.60	$\chi^2=10.585$ $p=0.014^*$	14	82.40	3	17.60	$\chi^2=7.132$ $p=0.068$
Secondary school	9	69.20	4	30.80		5	71.40	2	28.60	
High school	7	30.40	16	69.60		7	58.30	5	41.70	
Undergraduate and above	5	31.30	11	68.80		1	20.00	4	80.00	
Age (year)										
18-24	2	100.00	0	0.00	$\chi^2=8.614$ $p=0.072$	0	0.00	0	0.00	$\chi^2=3.895$ $p=0.143$
25-30	0	0.00	2	100.00		0	0.00	0	0.00	
31-37	1	33.30	2	66.70		1	100.00	0	0.00	
38-50	9	34.60	17	65.40		3	37.50	5	62.50	
51-64	44	57.90	32	42.10		23	71.90	9	28.10	
Place of Residence										
City	36	45.00	44	55.00	$\chi^2=4.894$ $p=0.027^*$	12	52.20	11	47.80	$\chi^2=4.360$ $p=0.037^*$
Rural	20	69.00	9	31.00		15	83.30	3	16.70	
Medical Nutrition Therapy Interview Frequency										
No	20	58.80	14	41.20	$\chi^2=3.398$ $p=0.183$	11	64.70	6	35.30	$\chi^2=2.014$ $p=0.365$
1 time	22	56.40	17	43.60		14	73.70	5	26.30	
>1 time	14	38.90	22	61.10		2	40.00	3	60.00	
0-1500 points: low self-efficacy level, 1500+ points: high self-efficacy level. In-group analysis: chi-square test analysis. $p^* < 0.05$										

A significant difference was found between the DSES classifications of women and their educational status and place of residence and only place of residence among men ($p < 0.05$). There was no significant difference between the total score of the diet self-efficacy scale and the BMI of the individuals by gender ($p > 0.05$).

In women, a significant difference was found between total DSES and age only ($p < 0.05$) while a significant difference was found between the total score of DSES and waist circumference for men ($p < 0.05$).

The total score of the DSES showed that while a negative significant correlation was found between the age ($p < 0.05$), a significant positive correlation was found between the educational status ($p < 0.01$).

A significant difference was found between the scores obtained from all sections and the total of the NLATA ($p < 0.001$). Evaluation of DSES scores according to the nutrition literacy levels of the participants is given in Table 3.

A significant difference was found between the total scores of DSES ($p < 0.05$). A significant difference was found between the nutrition literacy levels and DSES scores determined according to the score obtained from the general nutritional information section of the participants ($p < 0.05$). There were significant differences between the nutrition literacy levels and DSES scores determined according to the score obtained from the reading comprehension section; the food groups section; the portion quantities section; the numeracy literacy and food label reading section ($p < 0.05$ for all). A very significant positive correlation was found between the total DSES scores of the individuals participating in the study and the sections and the total scores of NLATA ($p < 0.001$). While a moderate positive correlation was found between total DSES score and NLATA total and portion amounts section scores, a weak relationship was found between other departments ($p < 0.001$).

Table 3. Evaluation of diet self-efficacy scale scores according to the nutritional literacy levels of the participants

Nutrition Literacy Assessment Tool in Adult Total Score								
Diet Self-Efficacy Scale Total Score	Insufficient ¹	Mean±SD	Borderline ²	Mean±SD	Sufficient ³	Mean±SD	Kruskal Wallis Test	Mann Whitney U test
	561.91±212.22		1413.84±674.39		1789.64±662.50		$\chi^2=46.920$ $p=0.000^*$	$p^{1-2}=0.000^*$ $p^{1-3}=0.000^*$ $p^{2-3}=0.002^*$
	General Nutritional Information Section Score							
	Insufficient ¹	Mean±SD	Borderline ²	Mean±SD	Sufficient ³	Mean±SD	Kruskal Wallis Test	Mann Whitney U test
	917.78±556.91		1197.74±702.50		1777.86±647.85		$\chi^2=31.971$ $p=0.000^*$	$p^{1-2}=0.091$ $p^{1-3}=0.000^*$ $p^{2-3}=0.000^*$
	Reading Comprehension Section Score							
	Insufficient ¹	Mean±SD	Borderline ²	Mean±SD	Sufficient ³	Mean±SD	Kruskal Wallis Test	Mann Whitney U test
	1026.15±544.85		1494.62±751.67		1755.59±711.55		$\chi^2=27.997$ $p=0.000^*$	$p^{1-2}=0.002^*$ $p^{1-3}=0.000^*$ $p^{2-3}=0.092$
	Food Groups Section Score							
	Insufficient ¹	Mean±SD	Borderline ²	Mean±SD	Sufficient ³	Mean±SD	Kruskal Wallis Test	Mann Whitney U test
929.31±765.32		1536.40±636.82		1561.15±692.34		$\chi^2=19.508$ $p=0.000^*$	$p^{1-2}=0.001^*$ $p^{1-3}=0.000^*$ $p^{2-3}=0.921$	
Portion Quantities Section Score								
Insufficient ¹	Mean±SD	Borderline ²	Mean±SD	Sufficient ³	Mean±SD	Kruskal Wallis Test	Mann Whitney U test	
1168.69±716.23		1692.22±545.23		1948.10±733.13		$\chi^2=27.524$ $p=0.000^*$	$p^{1-2}=0.000^*$ $p^{1-3}=0.000^*$ $p^{2-3}=0.117$	
Numeracy Literacy and Food Label Reading Section Score								
Insufficient ¹	Mean±SD	Borderline ²	Mean±SD	Sufficient ³	Mean±SD	Kruskal Wallis Test	Mann Whitney U test	
1338.81±701.38		1774.00±679.67		1842.86±1087.61		$\chi^2=8.953$ $p=0.011^*$	$p^{1-2}=0.005^*$ $p^{1-3}=0.198$ $p^{2-3}=0.721$	

Intergroup analysis: Kruskal Wallis Test. Multiple comparisons: Mann Whitney U test. * $p < 0.05$

DISCUSSION

Age and gender are considered as unchangeable risk factors and there is a risk for developing CVD in men over 45 years old and in women over 55 years old (10). In "Ongoing Telmisartan Alone and in combination with Ramipril Global Endpoint Trial (ONTARGET) and Telmisartan Randomized Assessment (TRANSCEND)" studies (9,378 women and 22,168 men) 31,000 patients were followed for an average of 56 months and women were found to have an average of 20 % less risk than men (11). In the study of Assessment of Factors Affecting Cardiovascular Diseases and Comparison of Cardiovascular Risk Scores conducted by Dölek et al. (12), the risk in men was found to be statistically significantly higher than in women. In the Primary Care Health Service Chronic Disease Monitoring Field Application Study; it is found that 50.00 % of the participants in the study were between 40-54 years old and 70.00 % were women (13). When the cardiovascular risk assessment data were analyzed by gender, 42.60 % of men were in the high and very high-risk group, while this ratio was 19.70 % in women and this difference was statistically significant. Our study was similar in terms of the participants' distribution of gender and mean age. As stated in the Primary Care Health Service Chronic Disease Monitoring Field Application Study, the number of men participants were relatively low and the average age of the men was higher than the women, and it is thought that the fact that men apply less to health centers because they work at the ages when they are "active" may be related to their early retirement and more frequent post-retirement (13).

Nutrition literacy, besides the ability to obtain and understand nutritional information, is the state of having the ability to make the appropriate nutritional decisions. Individuals with sufficient nutrition literacy levels have basic nutritional knowledge and have the skills to understand information about food items and food groups; read food labels, and control portion sizes (6,14). Individuals treated with MNT for CVD or risk factors need to know the content of the nutrients in their diets; be able to control portion sizes and make appropriate food and/or food product preferences by reading the labels (14). Costarelli et al. (15) found the mean total scores of nutrition literacy scales as 22.11 ± 5.67 and sufficient nutrition literacy levels (89.20 % of the participants) among Greek adults with chronic diseases in 2019 while we found our participants' nutrition literacy levels as borderline. One of the reasons for the difference between the findings may be that Costarelli et al. worked with a sample with a lower

average age (44.52 ± 17.44 years), and educational status may be one of the reasons for this difference. There are a limited number of studies examining the relationship between nutrition literacy and educational status. In a study conducted by Aihara and Minai (16) on the barriers of nutrition literacy among the elderly Japanese people; low educational status was associated with limited nutrition literacy among women and we found a very significant strong correlation between nutrition literacy levels and education in men and women participants ($p < 0.01$). As the participants' educational levels increased, their nutrition literacy levels were also increased.

Nutritional information assessment is a significant component in nutritional research and is a prerequisite for the implementation of many policies and programs aiming at improving eating behavior (17). We found no significant relationship between previous medical nutrition therapy and the level of nutritional knowledge. This may be due to the effectiveness of medical nutrition therapy or the fact that nutrition education has not been given to the patient in the context of medical nutrition therapy.

Literacy skills are significant determinants of health and affect individuals' ability to prevent, manage and treat disease (18). Diet compliance is important for a healthy lifestyle. Individuals must demonstrate determination and individual competence to comply with diet (8). Self-efficacy belief is called the belief that "the individual can organize and successfully perform the activity necessary to perform a certain performance". It can be said that the individual self-efficacy belief in the conduct of behavior affects and directs the behavior. This "I can do it belief" reflects the feeling of controlling the conditions and if the individual believes that he/she can achieve results then determines the course of his life by acting more actively. According to the self-efficacy theory, if the individual believes that he/she can reach a result, he acts more actively and can control life (8,19).

Self-efficacy of patients is very important in controlling heart disease and preventing risk factors, which is the number one cause of death in our country and the world, and which requires diet. The dietary self-efficacy level of individuals shows their ability to create behavior change and follow the diet. It is thought that nutrition education can be shaped according to the diet self-efficacy level of individuals. It is anticipated that if the self-efficacy of the patients is low, nutrition education to be provided can be enriched by providing the necessary motivation and by

offering solutions to the problems of the individuals, thus increasing the self-efficacy belief of the patient and ensuring compliance with the diet (8). In this study, according to the diet self-efficacy levels of the participants; nutrition literacy levels and components of nutrition literacy; general nutritional knowledge, reading comprehension skills, food groups information, portion quantities information, and numeracy literacy and food label reading skill levels were analyzed by inter-group analysis, and a significant difference was found between all parameters ($p < 0.05$). Participants with a high level of diet self-efficacy were found to have significantly higher levels of nutrition literacy, general nutritional knowledge, reading comprehension, food groups information, portion quantities information, numeracy literacy, and food label reading skills.

CONCLUSION

Our results emphasize the importance of medical nutrition therapy in the management of cardiovascular disease and risk factors, the necessity of organizing medical nutrition therapy for these individuals by a dietician, and providing nutrition education to individuals the scope of medical nutrition therapy. As a result of the study, "as the nutrition literacy levels of individuals increase, dietary self-efficacy levels also increase". According to this result, it is recommended to determine the nutrition literacy levels of individuals and organize nutrition education to increase the nutrition literacy levels of individuals. It is also emphasized that nutrition education aimed at increasing the nutrition literacy level can increase the success rate of medical nutrition therapy by increasing the diet self-efficacy levels, which are the indicators of individuals' behavior change capacity.

DECLARATIONS

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of Interest/Competing Interests

The authors declare no conflicts of interest to disclose.

Ethics Approval

This study was performed with the ethical approval of the Yeditepe University Clinical Research Ethics Committee dated 07.11.2019 after obtaining the necessary permissions from Isparta Provincial Health Directorate. The authors declare that all experiments on human subjects were conducted following the Declaration of Helsinki and that

all procedures were carried out with the adequate understanding and written consent of the subjects.

Availability of Data and Material

We can provide the original data

Authors' Contributions

Kübra Kazak: Conception and design of the study; generation, collection, assembly, analysis and interpretation of data; and drafting or revision of the manuscript; approval of the final version of the manuscript; Binnur Okan Bakır: Conception and design of the study; and drafting or revision of the manuscript; approval of the final version of the manuscript.

REFERENCES

1. Samur, G. Kalp Damar Hastalıklarında Beslenme. Sağlık Bakanlığı Yayın No:728; Ankara; 2008
2. Gibbs, H. Chapman-Novakofski, K. Establishing Content Validity for the Nutrition Literacy Assessment Instrument. *Prev Chronic Dis* 2013;10:120267. DOI: <http://dx.doi.org/10.5888/pcd10.120267>
3. Gibbs, H. Ellerbeck, E. The Nutrition Literacy Assessment Instrument (Nlit) Is A Valid And Reliable Measure Of Nutrition Literacy In Adults With Chronic Disease. *J Nutr Educ Behav*. 2018 March ; 50:3: 247–257.e1. doi:10.1016/j.jneb.2017.10.008.
4. Ghimire, S. Barriers To Diet And Exercise Among Nepalese Type 2 Diabetic Patients. *Hindawi International Scholarly Research Notices Volume 2017, Article ID 1273084, 9 Pages* <https://doi.org/10.1155/2017/1273084>
5. Chair, S.K. Wong, K.B. Yee-Man Tang, J. Wang, Q. & Cheng, H.Y. Social support as a predictor of diet and exercise self-efficacy in patients with coronary artery disease. *Contemporary Nurse*, 2015; 51:2-3, 188-199, DOI: 10.1080/10376178.2016.1171726
6. Cesur, B. Evaluation Instrument of Nutrition Literacy on Adults (EINLA) A Validity and Reliability Study. *Integr Food Nutr Metab*; 2015;2(1): 127-130 doi: 10.15761/IFNM.1000125
7. Bandura, A. Guide for Constructing Self-Efficacy Scales, Self-Efficacy Beliefs of Adolescents Adolescence and Education. (Ed) Urdan T, Pajares F, IAP, 2006 ISBN 1607527502, 9781607527503
8. Sevinç, S. & Argon, G. Kalp Hastalarında Beslenme Alışkanlıklarının Düzenlenmesinde Öz-yeterlilik Ölçeğinin Türkçe Geçerlilik ve Güvenirliliği. *Ege Üniversitesi Hemşirelik Fakültesi Dergisi*, 2014;30(2):19-33
9. World Health Organization. Waist circumference and waist-hip ratio: report of a WHO expert consultation, Geneva, 8-11 December 2008.
10. Beyhan Cengiz ÖZYURT, Manisa'da Kırsal Bir Bölgede Yaşayan 45 Yaş ve Üzeri Erkeklerde Kardiyovasküler Hastalık Risk, F.Ü.Sağ.Bil.Tıp Derg. 2010; 24 (2): 101
11. Kappert K, Böhm M, Schmieder R, et al. Impact of sex on cardiovascular outcome in patients at high cardiovascular risk: Analysis of the Telmisartan Randomized Assessment Study in ACE-Intolerant Subjects With Cardiovascular Disease (TRANSCEND) and the Ongoing Telmisartan Alone and in Combination With Ramipril Global End Point Trial (ONTARGET). *Circulation*. 2012; 126: 934-41
12. Hatice Dülek, Zeynep Tuzcular Vural, Işık Gönenç, Kardiyovasküler Hastalıklara Etki Eden Faktörlerin Değerlendirilmesi ve Kardiyovasküler Risk Skorlamalarının Karşılaştırılması, *Dicle Tıp Dergisi / Dicle Med J* (2019) 46 (3) : 449 – 459

13. Birinci Basamak Sağlık Hizmeti Kronik Hastalık İzlemi Saha Uygulama Çalışması (İstanbul, Ankara, Erzurum), T.C. Sağlık Bakanlığı Yayın No : 1119, Ankara, 2018 ISBN : 978-975-590-727-7
14. Demir Özdenk G. Bir Üniversite Çalışanlarının Beslenme Okuryazarlığı, Beslenme Davranışları ve İlişkili Faktörler, Turk J Public Health; 2018;16(3)
15. Costarelli et al. Health and nutrition literacy levels in Greek adults with chronic disease, Public Health Panorama, volume 5, issue 2–3 , june–september 2019 | 123–329
16. Aihara Y, Minai J. Barriers and catalysts of nutrition literacy among elderly Japanese people. Health Promot Int. 2011 Dec;26(4):421-31. doi: 10.1093/heapro/dar005. Epub 2011 Feb 8.
17. Putnoky et al. Reliability and validity of a General Nutrition Knowledge Questionnaire for adults in a Romanian population. European Journal of Clinical Nutrition: 2020 <https://doi.org/10.1038/s41430-020-0616-5>
18. Martin L T ve ark. Literacy Skills and Calculated 10-Year Risk of Coronary Heart Disease. J Gen Intern Med 26(1):45–50: 2010 DOI: 10.1007/s11606-010-1488-5
19. Arseven, A. "Öz Yeterlilik: Bir Kavram Analizi / Self-Efficacy: A Concept Analysis", Turkish Studies -International Periodical for the Languages, Literature and History of Turkish or Turkic-, ISSN: 1308-2140, (2016) Volume 11/19 Fall 2016, Ankara/Turkey, www.turkishstudies.net, DOI Number: <http://dx.doi.org/10.7827/TurkishStudies.10001>, p. 63-80.