Clinical and Experimental Health Sciences

Assessment of Dietary Behaviors and Influencing Factors Among Patients with Heart Failure: A Cross-Sectional Study

Duygu Mataracı Değirmenci[1], Yasemin Kalkan Uğurlu[2], Zehra Tuğçe Bayrak[3], Aleyna Aksu[3]

[1] Ordu University, Faculty of Health Science, Department of Nutrition and Dietetics, Ordu, Türkiye.
[2] Ordu University, Faculty of Health Science, Department of Nursing, Ordu, Türkiye.
[3] Giresun Education ve Research Hospital, Giresun, Türkiye.

Correspondence Author: Duygu Mataracı Değirmenci
E-mail: duygu.mataraci@hotmail.com
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ABSTRACT

Objective: This study was conducted to determine the nutritional behaviours and related factors in individuals with heart failure (HF).

Methods: The study was descriptive in nature and was conducted with a sample of 178 individuals over 18 years of age and diagnosed with HF. Data were collected using the Patient Information Form and the Scale for Dietary Behaviors in Heart Failure (SDBHF)

Results: It was found that SDBHF total scores of the participants differed according to variables such as comorbidity, hypertension, smoking duration, special diet application status, reason for skipping lunch and snack consumption status ($p<.05$). In addition, it was determined that the scores of the Healthy Habits Subscale of the SDBHF differed according to the snack consumption status of the participants ($p<.05$). It was found that the Salt Restriction Subscale scores differed according to variables such as hypertension and special diet application status ($p<.05$). It was determined that the Sugar Restriction subscale scores differed according to variables such as gender, employment status, presence of diabetes, smoking duration, alcohol consumption status and special diet application status ($p<.05$). Prevention of Fluid Retention subscale scores were found to differ according to variables such as gender, marital status, educational status, employment status, income level, smoking duration, chewing difficulty after memory, and presence of constipation after diagnosis ($p<.05$).

Conclusion: The results showed that the nutritional status of HF patients is in accordance with the current guidelines.

Keywords: Diet, heart failure, nutrition

1. INTRODUCTION

Heart failure (HF) is a condition in which the heart fails to pump enough blood to meet the needs of the tissues as a result of a structural and functional disorder of the heart. This syndrome, which has high mortality and hospitalisation rates worldwide, causes a great increase in healthcare expenditures (1). While 1-2% of the adult population in developed countries have a diagnosis of HF, it is known that the number of patients diagnosed with HF worldwide is approximately 64.3 million (2). The prevalence of heart failure is gradually increasing with the aging of societies (3).

Adequate and balanced nutrition plays an important role in preventing or alleviating the severity of symptoms of heart failure. In addition, nutritional behaviours are also highly determinant in preventing comorbidity or reducing the severity of diseases (3). Therefore, determination of patients' nutritional behaviours and related factors is very important in terms of developing nutritional treatment strategies (4).

Regulation of dietary habits is very important in HF management. The main aim of nutritional recommendations for patients with HF is to prevent further strain by reducing the workload of the heart (5). Noncompliance with diet worsens HF symptoms and increases rehospitalisation (6). Therefore, monitoring the nutritional behaviour of HF patients is very important in reducing the health and economic burden (7).

Studies investigating the relationship between heart failure and nutrition focus on the effect of sodium-restricted diets (8) and nutrient deficiencies observed in patients with HF (9). However, these studies largely emphasize physiological aspects such as electrolyte balance and do not sufficiently address the broader concept of patients' overall nutritional behaviours, including food choices, meal patterns, and lifestyle-related influences. Studies examining the factors affecting the nutritional behaviours of patients and determining the frequently encountered nutritional problems are very limited

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(3,10). As a result, there is a clear gap in the literature regarding a holistic understanding of dietary behaviour in individuals with HF, particularly from a behavioural and psychosocial perspective. In this study, it was aimed to determine the nutritional behaviours and related factors of individuals diagnosed with heart failure. By focusing on both behavioural patterns and associated socio-demographic variables, this study intends to contribute a broader perspective to the literature and inform future dietary interventions tailored to HF patients.

2. METHODS

2.1. Ethical Principles

The informed consent form was read to the volunteers by the researcher, their written consent was obtained and they were included in the study. The informed consent form included explanations that the participants could leave the study at any time, that their answers to the questions would be kept confidential and would not be shared with anyone, that participation in the study was completely voluntary and that there was no obligation to participate. Written permission for use was obtained from the author who developed the scale used in the study. Ethical approval was obtained from the Non-Interventional Scientific Research Ethics Committee of Ordu University and institutional approval was obtained from Giresun Provincial Health Directorate.

2.2. Participants

The population of the study consisted of all patients who were hospitalised in the cardiology clinic of Giresun Training and Research Hospital between January 2024 and October 2024 and diagnosed with HF. In the descriptive and correlational study, the data collection form was applied face-to-face. Based on power analysis, a minimum sample size of 138 was considered sufficient and 178 people participated in the study. Individuals who were older than 18 years of age, diagnosed with HF at least six months ago, and had no communication problems were included in the study, while individuals who requested to withdraw from the study for any reason after participating in the study were excluded from the study.

Patients were recruited during their inpatient stay in the cardiology clinic, based on their willingness to participate and eligibility according to inclusion criteria. No randomisation was performed, as the study did not involve any intervention. Therefore, all patients who met the criteria and agreed to participate were included consecutively. Although refusal rates were not systematically recorded, there were no reports of active withdrawal once participation had commenced. This non-randomised, single-center recruitment approach may pose a risk of selection bias and limit the representativeness of the sample to the broader heart failure population.

2.3. Collection of Data

Data were collected in face-to-face interviews using the Patient Information Form and Scale for Dietary Behaviors in Heart Failure. To minimize interviewer bias and ensure consistency, all face-to-face interviews were conducted by two nurses with experience in patient communication, both of whom were employed at the hospital where the study was conducted. A standardized interview protocol was followed throughout the data collection process to promote uniformity in the administration of questionnaires. Interviewers were instructed to avoid leading questions and to maintain a neutral tone and body language during all interactions. Although face-to-face interviews allowed for clarification of items and enhanced participant understanding, the potential for social desirability bias cannot be entirely ruled out and is acknowledged as a limitation of the study.

2.3.1. Patient Introduction Form: In the first part of the patient introduction form, which was created by the researchers in line with the literature (5,6,9), there are 9 questions (age, gender, marital status, educational status, occupation, income status, presence of comorbidity, smoking status, alcohol use status) to define demographic and clinical characteristics. In the second part of the form, there are questions evaluating nutrition and dietary habits. The questionnaire was developed by one of the researchers, who holds expertise in nutrition and dietetics, based on a comprehensive review of relevant literature in the fields of cardiology and nutrition. Although no formal expert panel was convened, the content was structured in alignment with evidence-based sources.

2.3.2. Scale for Dietary Behaviors in Heart Failure (SDBHF): The scale developed by Boy and Enç consists of 4 sub-dimensions (healthy habits, salt restriction, sugar restriction, and prevention of fluid retention) and 19 items (11). The "'Healthy Habits"' sub-dimension of the scale consists of items 4, 5, 11, 12, 16; "'Salt Restriction"' sub-dimension: items 1, 3, 7, 9, 10, 15; "'Sugar Restriction"' sub-dimension: items 6, 17, 19; "'Prevention of Fluid Retention"' sub-dimension: items 2, 8, 13, 14 and 18. Items 3, 6, 7, 9, 10, 15, 19 should be reverse coded. The lowest score of 19 points and the highest score of 76 points can be obtained from the scale. A score of 46 and above on the scale indicates that HF patients exhibit nutritional behaviours in accordance with the guidelines, whereas a score of 45 and below indicates that HF patients do not eat in accordance with the nutritional recommendations of the guidelines. In the Turkish adaptation of the scale, Cronbach's alpha value was found to be 0.72 (11). In this study, it was determined as 0.58.

2.4. Statistical Evaluation

IBM SPSS Statistics 22 (IBM SPSS, Turkey) programme was used for statistical analysis of the findings obtained in the study. The normality of the data was assessed using the Kolmogorov-Smirnov test, and all variables were found to be normally distributed ($p>.05$). Therefore, parametric tests were applied. In addition to descriptive statistical methods (mean, standard deviation, frequency), Independent Sample T Test was used for comparisons between two groups and One-Way Anova test was used for comparisons between more than two groups. Pearson correlation analysis was conducted to examine the relationships

between the SDBHF total and subscale scores and selected independent variables. For statistically significant results (p<.05), effect sizes were calculated using Cohen's *d* for t-tests and eta squared (η^2) for ANOVA, in order to determine the magnitude of the differences. Significance was accepted as p<.05.

3. RESULTS

The mean total SDBHF scale score of individuals with chronic heart failure was 45.92±6.18. The subscale scores of the scale were determined as healthy habits subscale 12.20±2.38, salt restriction 16.76±3.97, sugar restriction 8.70±2.03, and prevention of fluid retention 8.24±1.77, respectively. Given that the cut-off point of the SDBHF is 46, this average score suggests that more than half of the participants did not adhere to dietary recommendations for heart failure management. The individuals included in the study were predominantly over 75 years of age (38.76%), male (63.5%) and married (72.5%). It was determined that 50.6% of the participants were primary school graduates, 47.8% were retired, and 71.3% of them had an income equivalent to their expenses. Significant differences in dietary behaviours were observed according to gender, marital status, educational level, income status, smoking and alcohol use, and presence of comorbidities (p<.05). It was determined that the sugar restriction subscale score of the participants differed according to gender and employment status and these differences were statistically significant (p<.05). In addition, it was determined that the prevention of fluid retention subscale scores showed statistically significant differences according to gender, marital status, educational status and income level (p<.05) (Table 1).

Table 1. *Sociodemographic characteristics and SDBHF scale (n=178)*

Sociodemographic Characteristics		SDBHF Total Score	Healthy Habits Subscale Score	Salt Restriction Subscale Score	Sugar Restriction Subscale Score	Prevent Retention Subscale Score
	(n,%)	X±SD	X±SD	X±SD	X±SD	X±SD
All participants		45.92±6.18	12.20±2.38	16.76±3.97	8.70±2.03	8.24±1.77
Age						
18-39	1 (0.56)	48.00	13.00	14.00	10.00	11.00
40-64	51 (28.65)	45.11±6.20	11.90±2.51	16.13±3.66	8.49±2.12	8.58±1.60
65-74	57 (32.02)	45.94±6.57	12.08±2.03	17.10±4.75	8.50±2.20	8.24±1.94
≥75	69 (38.76)	46.46±5.90	12.52±2.55	16.98±3.48	9.01±1.81	7.94±1.68
		p=.685[b]	p=.517[b]	p=.500[b]	p=.380[b]	p=.094[b]
Gender						
Female	65 (36.5)	45.96±5.92	12.23±2.69	16.83±3.16	9.18±1.86	7.72±1.65
Male	113 (63.5)	45.89±6.35	12.19±2.19	16.72±4.39	8.43±2.08	8.53±1.77
		p=.938[a]	p=.923[a]	p=.866[a]	**p=.017[a*] d=.027**	**p=.003[a**] d=.050**
Marital Status						
Married	129 (72.5)	46.24±6.10	12.21±2.40	16.76±4.08	8.79±2.05	8.46±1.76
Single	49 (27.5)	45.06±6.37	12.18±2.36	16.75±3.71	8.46±2.00	7.65±1.65
		p=.254[a]	p=.934[a]	p=.985[a]	p=.337[a]	**p=.006[a**] d=0.042**
Education level						
Literate	39 (21.9)	45.15±4.86	11.79±2.24	17.05±3.48	8.82±1.99	7.48±1.80
Primary school	90 (50.6)	45.72±6.86	12.35±2.46	16.42±4.33	8.77±2.13	8.16±1.62
Secondary school	28 (15.7)	46.28±5.53	12.10±2.60	16.57±3.09	8.78±2.00	8.82±1.67
High school	18 (10.1)	48.61±6.18	12.38±2.09	18.83±3.85	8.00±1.78	9.38±1.91
University	3 (1.7)	42.33±1.15	13.00±1.73	12.66±2.08	8.66±1.52	8.00±1.00
		p=.268[b]	p=.740[b]	p=.059[b]	p=.660[b]	**p=.001[b**] η^2=0.101**
Employment Status						
Unemployed	60 (33.7)	46.66±5.62	12.36±2.74	17.31±3.26	9.28±1.77	7.70±1.73
Employed	33 (18.5)	44.81±5.88	11.96±2.31	15.51±3.73	8.21±1.88	9.12±1.76
Retired	85 (47.8)	45.82±6.66	12.18±2.14	16.85±4.43	8.49±2.19	8.28±1.67
		p=.381[b]	p=.742[b]	p=.107[b]	**p=.021[b*] η^2=0.062**	**p=.001[b**] η^2=0.078**
Income						
Income < Expenses	40 (22.5)	45.45±6.89	12.10±2.72	17.05±3.57	8.70±2.25	7.60±2.04
Income = Expenses	127 (71.3)	45.97±6.09	12.26±2.33	16.55±4.09	8.78±1.97	8.37±1.56
Income > Expenses	11 (6.2)	47.00±4.71	11.90±1.57	18.18±3.94	7.81±1.88	9.09±2.34
		p=.752[b]	p=.847[b]	p=.376[b]	p=.320[b]	**p=.014[b*] η^2=0.048**

*a: Independent – Samples T Test, b: One-Way ANOVA, *p<.05; **p<.01; ***p<.001, SDBHF: The Scale for Dietary Behaviors in Heart Failure*
Effect sizes were calculated using Cohen's d for comparisons between two groups, and eta squared (η^2) for comparisons involving more than two groups

It was determined that the majority of the individuals in the study had comorbidities (84.8%), the most common comorbidity was hypertension (73.1%), and they did not smoke (71.9%) or drink alcohol (88.8%). It was found that SDBHF total score showed a significant difference according to the presence of comorbidity, hypertension and smoking duration (p<.05). Salt restriction subscale scores were found to differ according to the presence of hypertension (p<.05). It was determined that sugar restriction subscale scores differed statistically significantly according to the presence of diabetes, smoking duration and alcohol use (p<.05). In addition, statistically significant differences were found between prevention of fluid retention subscale scores according to smoking duration (p<.05) (Table 2).

Table 2. *Clinical characteristics and SDBHF scale (n=178)*

Clinical Characteristics		SDBHF Total Score	Healthy Habits Subscale Score	Salt Restriction Subscale Score	Sugar Restriction Subscale Score	Prevent Retention Subscale Score
Comorbidity	**(n,%)**	**X±SD**	**X±SD**	**X±SD**	**X±SD**	**X±SD**
Yes	151 (84.8)	46.41±6.11	12.29±2.41	17.00±4.04	8.82±1.95	8.29±1.79
No	27 (15.2)	43.18±5.95	11.70±2.18	15.44±3.32	8.07±2.38	7.96±1.62
		p=.012[a*] d=0.001	p=.234[a]	p=.061[a]	p=.079[a]	p=.376[a]
Hypertension						
Yes	130 (73.1)	46.74±6.20	12.36±2.45	17.18±4.00	8.85±1.91	8.33±1.76
No	48 (26.9)	43.68±5.60	11.77±2.13	15.62±3.69	8.31±2.30	7.97±1.76
		p=.003[a] d=0.003**	p=.138[a]	**p=.020[a*] d=0.015**	p=.151[a]	p=.230[a]
Diabetes Mellitus						
Yes	75 (42.1)	46.46±5.41	12.25±2.32	16.33±3.50	9.54±1.73	8.33±1.66
No	103	45.52±6.69	12.17±2.43	17.07±4.27	8.09±2.03	8.17±1.84
		p=.369[a]	p=.829[a]	p=.218[a]	**p<.001[a***] d=0.002**	p=.557[a]
Stroke						
Yes	6 (3.4)	44.16±2.40	11.16±1.94	15.50±2.50	9.16±2.13	8.33±1.36
No	172 (96.6)	45.98±6.27	12.24±2.39	16.80±4.01	8.69±2.03	8.23±1.78
		p=.477[a]	p=.278[a]	p=.430[a]	p=.576[a]	p=.898[a]
COPD						
Yes	22 (12.4)	45.22±5.99	12.09±1.97	17.00±3.36	8.40±1.89	7.72±1.63
No	156 (87.6)	46.01±6.22	12.22±2.44	16.73±4.06	8.75±2.05	8.31±1.78
		p=.553[a]	p=.807[a]	p=.767[a]	p=.464[a]	p=.146[a]
Chronic Renal Failure						
Yes	7 (3.9)	46.57±3.73	11.85±0.89	18.71±3.49	8.57±1.90	7.42±2.29
No	171 (96.1)	45.89±6.27	12.22±2.42	16.68±3.98	8.71±2.04	8.27±1.74
		p=.800[a]	p=.368[a]	p=.186[a]	p=.857[a]	p=.216[a]
Smoking						
Yes	50 (28.1)	44.96±5.91	11.88±2.53	16.02±3.44	8.48±1.96	8.58±1.60
No	128 (71.9)	46.29±6.27	12.33±2.31	17.05±4.14	8.79±2.06	8.10±1.81
		p=.196[a]	p=.252[a]	p=.119[a]	p=.353[a]	p=.111[a]
Years of smoking						
1-10 years	8 (4.5)	45.42±4.50	12.28±3.03	17.71±2.28	9.71±1.38	9.57±1.39
11-30 years	21 (11.8)	45.76±5.84	12.00±2.44	15.38±3.69	8.66±2.37	8.19±2.11
31-70 years	21 (11.8)	43.28±5.78	11.95±2.29	16.04±4.28	7.47±2.20	7.61±1.46
		p=.011[b*] η^2=0.045	p=.952[b]	p=.382[b]	**p=.049[b*] η^2=0.051**	**p=.049[b*] η^2=0.005**
Alcohol consumption						
Yes	20 (11.2)	44.65±6.91	11.45±2.21	17.20±6.73	7.65±1.95	8.35±2.13
No	158 (88.8)	46.08±6.09	12.30±2.39	16.70±3.50	8.84±2.01	8.22±1.72
		p=.331[a]	p=.132[a]	p=.752[a]	**p=.013[a*] d=0.002**	p=.772[a]

*a: Independent – Samples T Test, b: One-Way ANOVA, *p<.05; **p<.01; ***p<.001, SDBHF: The Scale for Dietary Behaviors in Heart Failure, COPD: Chronic Obstructive Pulmonary Disease*

Effect sizes were calculated using Cohen's d for comparisons between two groups, and eta squared (η^2) for comparisons involving more than two groups

Table 3. *Nutrition, dietary habits and SDBHF scale (n=178)*

Clinical Characteristics		SDBHF Total Score	Healthy Habits Subscale Score	Salt Restriction Subscale Score	Sugar Restriction Subscale Score	Prevent Retention Subscale Score
	(n,%)	X±SD	X±SD	X±SD	X±SD	X±SD
Special diet application situation						
Yes	44 (24.7)	49.27±6.58	12.60±2.79	19.05±4.96	9.17±1.95	8.45±2.35
No	134 (75.3)	44.97±5.76	12.09±2.36	16.10±3.39	8.57±2.03	8.20±1.56
		p<.001[a***] **d=0.005**	p=.243[a]	**p<.001**[a***] **d=0.014**	p=.100[a]	p=.445[a]
Commonly applied diet types (n=44)						
Diabetic diet	8 (18.2)	46.14±5.72	11.71±2.81	15.00±2.94	11.42±0.53	8.00±2.38
Salt-free diet	19 (43.2)	50.50±7.78	13.27±3.00	20.77±6.19	8.50±1.79	7.94±2.26
Salt-free diabetic diet	13 (29.6)	49.16±5.14	12.50±2.61	18.33±2.22	9.16±1.89	9.16±1.99
Low fat salt free diet	2 (4.5)	49.00±8.48	10.50±2.12	22.50±0.70	7.00±0.00	9.00±5.65
Weight loss diet	2 (4.5)	51.00	12.00	18.00	10.00	11.00
		p=.704[b]	p=.585[b]	p=.078[b]	**p=.003**[b**] **η^2=0.017**	p=.498[b]
Daily meal frequency?						
1 meal	1 (0.6)	43.00	14.00	14.00	7.00	8.00
2 meals	59 (33.1)	44.61±5.86	12.00±2.48	16.00±3.21	9.00±2.01	7.91±1.76
3 meals	118 (66.3)	46.60±6.27	12.29±2.33	17.16±4.27	8.72±2.05	8.40±1.76
		p=.116[b]	p=.558[b]	p=.143[b]	p=.701[b]	p=.218[b]
Skipped meal (n=60)						
Breakfast	18 (30.0)	44.16±5.31	12.00±2.40	15.55±2.95	8.44±2.14	8.16±1.20
Lunch	38 (63.3)	45.13±6.12	12.07±2.58	16.42±3.11	8.89±1.91	7.73±1.94
Dinner	4 (6.7)	41.25±4.99	11.75±2.36	13.50±4.50	7.50±2.38	8.50±2.08
		p=.426[b]	p=.967[b]	p=.180[b]	p=.365[b]	p=.553[b]
Breakfast skipping reason (n=18)						
Loss of appetite	6 (33.4)	45.00±7.48	13.16±3.43	15.50±4.03	8.33±1.63	8.00±1.54
Not used to it	8 (44.5)	43.25±4.65	11.25±1.83	16.25±2.43	8.00±2.39	7.75±0.88
Not ready	1 (5.5)	49.00	13.00	17.00	10.00	9.00
Time constraints	2 (11.1)	42.00±1.41	11.00±0.00	13.50±2.12	8.00±2.82	9.50±0.70
Other	1 (5.5)	46.00	12.00	13.00	12.00	9.00
		p=.838[b]	p=.657[b]	p=.713[b]	p=.488[b]	p=.367[b]
Lunch skipping reason (n=38)						
Loss of appetite	9 (23.6)	49.00±7.82	13.33±3.16	17.77±3.23	9.44±1.42	8.44±2.18
Not used to it	22 (57.9)	43.77±4.40	11.45±2.08	16.13±3.16	8.63±1.98	7.54±1.76
Not ready	2 (5.3)	37.00±5.65	11.00±2.82	14.50±0.70	6.00±1.41	5.50±0.70
Time constraints	3 (7.9)	45.00±2.00	12.33±1.15	14.33±2.51	10.33±1.15	8.00±2.64
Other	2 (5.3)	57.00	18.00	20.00	9.00	10.00
		p=.012[b*] **η^2=0.040**	p=.052[b]	p=.275[b]	p=.106[b]	p=.257[b]
Dinner skipping reason (n=4)						
Loss of appetite	1 (25.0)	46.00	12.00	17.00	9.00	8.00
Not used to it	2 (50.0)	37.00±1.41	12.50±3.53	10.50±4.94	5.50±0.70	8.50±3.53
Other	1 (25.0)	45.0	10.00	16.00	10.00	9.00
		p=.164[b]	p=.864[b]	p=.634[b]	p=.171[b]	p=.981[b]
Snack consumption						
Yes	144 (80.9)	46.56±6.36	12.54±2.30	16.95±4.19	8.81±2.03	8.25±1.79
No	34 (19.1)	43.17±4.48	10.79±2.21	15.94±2.77	8.26±2.03	8.17±1.69
		p=.001[a**] **d=0.018**	**p<.001**[a***] **d=0.084**	p=.180[a]	p=.159a	p=.812[a]
Snack time (n=144)						
Mid-morning	1 (0.7)	46.00	15.00	15.00	8.00	8.00
Afternoon	104 (72.2)	46.35±6.06	12.53±2.34	16.65±3.64	8.91±1.99	8.25±1.73
Night	39 (27.1)	47.15±7.23	12.48±2.22	17.82±5.39	8.56±2.14	8.28±1.97
		p=.799[b]	p=.563[b]	p=.301[b]	p=.610[b]	p=.985[b]

Table 3. *(Continued)*

Clinical Characteristics		SDBHF Total Score	Healthy Habits Subscale Score	Salt Restriction Subscale Score	Sugar Restriction Subscale Score	Prevent Retention Subscale Score
	(n,%)	X±SD	X±SD	X±SD	X±SD	X±SD
Appetite change after HF diagnosis?						
No	107 (60.1)	45.84±6.08	12.06±2.15	16.83±4.20	8.55±2.19	8.39±1.81
Increase	1 (0.6)	40.00	14.00	9.00	10.00	7.00
Decrease	70 (39.3)	46.12±6.38	12.40±2.69	16.77±3.53	8.92±1.77	8.02±1.70
		p=.605[b]	p=.498[b]	p=.146[b]	p=.398[b]	p=.321[b]
Body weight change after HF diagnosis?						
Yes	27 (15.2)	46.07±5.51	12.74±2.33	16.33±3.28	9.11±1.92	7.88±1.50
No	112 (62.9)	45.25±6.42	11.81±2.27	16.67±4.40	8.46±2.07	8.30±1.92
Uncertain	39 (21.9)	47.71±5.68	12.97±2.51	17.30±3.01	9.12±1.94	8.30±1.47
		p=.100[b]	**p=.014[b*] η^2=0.048**	p=.580[b]	p=.115[b]	p=.534[b]
Frequent chewing difficulty after HF diagnosis?						
Yes	7 (3.9)	44.28±4.02	12.85±1.77	15.85±2.79	8.14±1.46	7.42±0.53
No	171 (96.1)	45.98±6.25	12.18±2.40	16.80±4.01	8.73±2.05	8.27±1.79
		p=.477[a]	p=.464[a]	p=.540[a]	p=.456[a]	**p=.004[a**] d=0.009**
Frequent swallowing difficulty after HF diagnosis?						
Yes	4 (2.2)	41.50±2.64	12.50±2.65	13.50±30.00	8.00±0.81	7.50±1.00
No	174 (97.8)	46.02±6.21	12.20±2.38	16.83±3.97	8.72±2.05	8.25±1.78
		p=.149[a]	p=.805[a]	p=.097[a]	p=.174[a]	p=.398[a]
Frequent indigestion/bloating after HF diagnosis?						
Yes	71 (39.9)	45.77±6.79	12.29±2.40	16.83±5.14	8.52±1.99	8.12±1.98
No	107 (60.1)	46.01±5.78	12.14±2.37	16.71±2.98	8.83±2.06	8.31±1.61
		p=.797[a]	p=.690[a]	p=.855[a]	p=.321[a]	p=.482[a]
Frequent diarrhea after HF diagnosis?						
Yes	15 (8.4)	47.06±6.04	13.40±2.41	16.80±4.12	8.93±2.05	7.93±1.83
No	163 (91.6)	45.81±6.20	12.09±2.35	16.76±3.97	8.68±2.04	8.26±1.76
		p=.455[a]	**p=.043[a*] d=0.023**	p=.971[a]	p=.656[a]	p=.483[a]
Frequent constipation after HF diagnosis?						
Yes	69 (38.8)	45.18±5.75	11.88±2.34	16.69±3.52	8.76±2.11	7.84±1.67
No	109 (61.2)	46.38±6.42	12.41±2.39	16.80±4.25	8.66±1.99	8.49±1.78
		p=.210[a]	p=.150[a]	p=.856[a]	p=.755[a]	**p=.016[a*] d=0.033**

*a: Independent – Samples T Test, b: One-Way ANOVA, *p<.05; **p<.01; ***p<.001, SDBHF: The Scale for Dietary Behaviors in Heart Failure, HF: Heart Failure Effect sizes were calculated using Cohen's d for comparisons between two groups, and eta squared (η^2) for comparisons involving more than two groups*

It was determined that the majority of the participants did not follow a special diet (75.3%), and those who followed a diet mostly followed a salt-free diet (43.2%). It was determined that 66.3% of the participants consumed 3 main meals a day, 63.3% of those who skipped main meals skipped lunch, and the most common reason for skipping meals for all main meals was that the food was not ready (44.5%). It was determined that 80.9% of the participants consumed snacks and the most snacks were consumed in the afternoon (72.2%). It was determined that 60.1% of the participants diagnosed with heart failure had no change in appetite, 62.9% experienced a change in body weight, and most of the participants did not experience chewing (96.1%) and swallowing (97.8%), digestion (60.1%), diarrhoea (91.6%), and constipation (61.2%) problems (Table 3). It was determined that the total SDBHF scores of the participants differed according to variables such as the status of applying a special diet, the reason for skipping lunch, and the status of consuming snacks, and these differences were statistically significant (p<.05). A significant difference was found between the healthy habits subscale scores of individuals diagnosed with HF according to variables such as the status of consuming snacks, the change in body weight after being diagnosed with HF, and diarrhoea problems frequently experienced after being diagnosed with HF (p<.05). It was determined that the salt restriction subscale scores of the participants showed a significant difference according to the status of applying a special diet (p<.05). It was found that the

sugar restriction subscale scores of the participants differed significantly according to the types of diet they commonly followed (p<.05). It was found that there was a statistically significant difference in the prevention of fluid retention subscale scores according to the status of experiencing chewing problems and constipation frequently after being diagnosed with HF (p<.05) (Table 3).

Only statistically significant correlations between the SDBHF total and subscale scores and selected independent variables are presented in Table 4. No significant associations were observed with the remaining variables (p>.05). A significant correlation was found between the SDBHF total score and gender, education level, income status, and the presence of frequent constipation after heart failure diagnosis. For the Healthy Habits Subscale, significant correlations emerged with snack consumption and the presence of frequent diarrhea after diagnosis. Regarding the Sugar Restriction Subscale, statistically significant associations were identified with gender, education level, presence of comorbidity, hypertension, adherence to a special diet, and frequent constipation. Additionally, the Prevent Retention Subscale scores showed significant correlations with gender, marital status, education level, and income status (p<.05). These findings indicate that demographic and clinical characteristics may influence specific dimensions of dietary behaviors in patients with heart failure (Table 4).

Although statistically significant differences were observed between dietary behaviours and various demographic and clinical variables, an evaluation of the effect sizes presented in the tables indicates that most of these differences are of small or limited clinical significance. The majority of effect sizes were in the small range (η^2<.06; Cohen's d<0.5), with only a few approaching a moderate level. This suggests that while the findings are statistically significant, their practical or clinical impact may be limited.

Table 4. *Correlation between SDBHF total and subscale scores and selected independent variables (n=178)*

Variables		SDBHF Total Score	Healthy Habits Subscale Score	Salt Restriction Subscale Score	Sugar Restriction Subscale Score	Prevent Retention Subscale Score
Gender	r	0.148	-0.007	0.030	0.165	0.223
	p	**.049***	.923	.691	**.028***	**.003****
Marital Status	r	-0.141	-0.006	-0.036	-0.132	-0.205
	p	.061	.934	.629	.079	**.006****
Education level	r	0.206	0.067	0.040	0.154	0.285
	p	**.006***	.372	.595	**.040***	**<.001*****
Income	r	0.163	0.005	0.071	0.124	0.219
	p	**.030***	.950	.347	.099	**.003****
Comorbidity	r	0.037	-0.090	0.066	0.179	-0.067
	p	.621	.234	.385	**.017***	.376
Hypertension	r	0.054	-0.092	0.122	0.175	-0.112
	p	.484	.238	.115	**.023***	.150
Special diet application situation	r	0.073	-0.089	0.117	0.182	-0.058
	p	.333	.243	.121	**.016***	.445
Snack consumption	r	-0.135	-0.289	0.037	-0.052	-0.018
	p	.072	**<.001*****	.626	.488	.812
Frequent diarrhea after HF diagnosis?	r	-0.012	-0.152	0.026	0.070	0.053
	p	.874	**.043***	.730	.352	.483
Frequent constipation after HF diagnosis?	r	0.180	0.108	0.022	0.157	0.181
	p	**.016***	.150	.768	**.036***	.016

*Pearson correlation analysis; *p<.05; **p<.01; ***p<.001; SDBHF: The Scale for Dietary Behaviors in Heart Failure, HF: Heart Failure*

4. DISCUSSION

Although nutrition is a determining factor in the development of heart failure, it also has a significant effect on the course of the disease. It has been reported that HF patients who are fed in accordance with the guidelines have reduced disease symptoms and improved quality of life (12,13,14). In this study, the SDBHF score of the participants was found to be 45.92. This finding shows that the nutritional behaviours of the participants were not compatible with the recommendations of guidelines and expert academicians. Educational level, cultural factors and economic conditions are among the reasons for this situation. This situation related to nutrition may make it difficult to control the symptoms of the disease and negatively affect the quality of life. What makes this finding particularly noteworthy is that, to our knowledge, this is one of the few studies in Türkiye to quantitatively assess dietary behaviour among hospitalized

HF patients using a validated scale. By numerically identifying this gap in dietary behaviours, our findings highlight a specific target for clinical intervention—namely, improving adherence to evidence-based dietary recommendations through structured education. These results suggest that nutrition education may have positive effects on disease symptoms and quality of life in patients with HF. Individuals who are fed in accordance with the guidelines may manage the disease better (15). Therefore, future studies examining the effects of dietary behaviours in accordance with the guidelines on the disease in more detail should be planned.

HF patients constitute an important risk group due to high mortality risk, high healthcare costs and comorbidities associated with unfavourable clinical outcomes. The presence of concomitant chronic diseases constitutes an important problem in HF management. It has been reported that a significant proportion of HF patients have at least two chronic diseases (16). The most common complications accompanying heart failure are obesity, diabetes and hypertension, followed by COPD and renal dysfunction (17). In this study, in accordance with the literature, it was concluded that the participants had similar comorbidities, especially hypertension and diabetes mellitus frequently accompany patients with HF. Accordingly, it is possible to say that hypertension and diabetes should be considered as priority targets in the management of HF. Controlling hypertension and diabetes with appropriate nutritional therapy may slow down or prevent the progression of HF (18). As reported in the literature, the prevalence of these two comorbidities suggests that nutrition programmes specific for these diseases may play an important role in the treatment of HF (18,19,20). In addition, COPD and renal dysfunction were found to be highly prevalent in our study. This finding suggests that individualised diet plans prepared by considering pulmonary and renal dysfunctions in HF patients may positively affect the course of the disease. This study also provides important contributions to the limited literature on how comorbidities such as diabetes and hypertension influence dietary behaviours in patients with heart failure. Contrary to the common assumption that comorbidities may negatively impact self-care behaviours, patients diagnosed with hypertension and diabetes were found to have significantly higher SDBHF total and subscale scores. In particular, those with hypertension had higher total scores and greater adherence to salt restriction, while those with diabetes had higher scores on the sugar restriction subscale. These findings suggest that the presence of certain comorbid conditions—such as hypertension and diabetes—may actually motivate individuals to adopt more conscious and guideline-consistent dietary behaviours. To the best of our knowledge, these associations have not been previously demonstrated using the SDBHF scale. In this respect, the study offers a novel perspective to the literature by emphasizing the need for individualized dietary interventions not only for patients with heart failure alone but also for those with coexisting hypertension and diabetes.

Smoking, which is considered to be an important risk factor in the occurrence of HF and worsening of the disease prognosis, not only damages the cardiovascular system but also indirectly causes progression of HF by negatively affecting nutritional habits and food metabolism (21). The fact that smoking decreases taste and smell senses and appetite increases the risk of malnutrition in HF patients. In addition, smoking may adversely affect the absorption of nutrients and cause micronutrient deficiencies, especially antioxidant vitamins (vitamin C and E), folate and magnesium. Deficiencies in these nutrients lead to increased inflammation and oxidative stress in HF patients, resulting in a poor prognosis. In addition, the fact that smoking promotes a tendency to consume processed and salty foods may lead to sodium and fluid imbalance in HF patients (22,23). The lower SDBHF scores of smokers compared with nonsmokers in this study support this finding. In addition, the fact that the scale scores of the longest-time smokers were the lowest is similar to the literature. Although the difference in dietary behaviour scale scores between smokers and non-smokers was not statistically significant, smokers generally had lower scores. However, when smoking duration was taken into account, the negative impact on dietary behaviours became more pronounced. As the duration of smoking increased, a significant decrease was observed in the total SDBHF scores (η^2=0.045), as well as in the Sugar Restriction (η^2=0.051) and Prevent Retention (η^2=0.005) subscale scores. These findings suggest that prolonged exposure to smoking may adversely affect adherence to dietary behaviours, particularly regarding sugar intake and fluid/sodium management. Notably, a moderate effect size was observed for sugar restriction behaviours (η^2=0.051), which may have clinical relevance. Although the effect sizes for the other subscales were small, the differences were still statistically significant. To the best of our knowledge, this is the first study to demonstrate these associations using the SDBHF scale, offering a novel perspective on how smoking duration may weaken dietary self-management in patients with HF.

The relationship between nutrition and alcohol consumption in patients with heart failure is of great importance for the management of the disease. A balanced diet supports general health by providing the vitamins and minerals required by the body. However, excessive alcohol consumption may disrupt this balance (24). Alcohol may prevent the absorption of nutrients in the body and lead to deficiency of some vitamins (especially B vitamins) (25). Furthermore, alcohol consumption may worsen heart failure by damaging the heart muscle and increase blood pressure (26). Therefore, it is recommended that individuals with heart failure limit or completely avoid alcohol consumption. Healthy eating habits and control of alcohol consumption may improve the quality of life of these patients and slow the progression of the disease. In this study, the low alcohol consumption in HF patients may reflect the awareness of patients or healthcare professionals that alcohol can worsen heart failure. Since the adverse effects of alcohol are known, these individuals may be avoiding alcohol consumption.

Healthy eating habits and low alcohol consumption may improve the quality of life of HF patients and slow disease progression. This study is among the few that quantitatively examine the relationship between alcohol consumption and specific dietary behaviours in patients with heart failure. Our findings showed that participants who consumed alcohol had lower total scores on the dietary behaviour scale, as well as lower scores on the Healthy Habits subscale compared to non-drinkers, although these differences were not statistically significant. Nevertheless, the overall trend in the data suggests that alcohol consumption may negatively influence dietary behaviour. In contrast, a statistically significant difference was observed in the Sugar Restriction subscale, where alcohol consumers scored significantly lower ($p<.05$; $\eta^2=0.002$). Although the effect size was small, this finding may still be clinically relevant from a behavioural standpoint. These results support the notion that alcohol consumption may impact not only physiological outcomes but also self-care behaviours such as adherence to dietary recommendations. Moreover, the fact that the analysis was based on the presence or absence of alcohol consumption, rather than its duration or quantity, is methodologically noteworthy. In this respect, the study contributes new insights to the literature by highlighting the need to consider alcohol-related behavioural patterns in HF patients and underscores the value of incorporating this factor into future intervention-based research.

In this study, it was determined that the frequency of a special diet was low in patients with HF. In the literature, it has been reported that dietary therapy plays a very important role in improving the disease prognosis and reducing complications in individuals with heart disease (1,3,10,12,14). Especially salt-free diet has been reported to control symptoms by decreasing fluid retention in patients with heart failure (1,10). Similarly, positive effects of diabetic diet on blood glucose regulation and the role of low-fat diet in the management of dyslipidaemia have been reported (27). However, in this study, low rates of implementation of these diets were observed. This suggests that dietary recommendations are not sufficiently adopted by patients or not sufficiently emphasised by healthcare professionals. It is thought that this may be due to individual, cultural or socioeconomic factors affecting diet compliance of patients. In addition, lack of dietary education and difficulties in implementing the diet in daily life may also be contributing factors. This lack of dietary adherence may be attributed to multiple factors, including insufficient awareness of dietary recommendations, inadequate nutritional counselling, low health literacy, and limited access to dietitian services within the healthcare system. Socioeconomic barriers such as financial constraints and limited educational background may also hinder patients' ability to implement structured dietary practices. Clinically, poor adherence to recommended dietary guidelines in heart failure patients can contribute to fluid retention, uncontrolled symptoms, increased hospitalization rates, and diminished quality of life. Therefore, routine nutritional screening and individualized dietary counselling should be integrated into heart failure management programs. Building on these findings, our study adds novel evidence regarding the behavioural impact of following a special diet among HF patients. Participants who reported adhering to a special diet had significantly higher total SDBHF scores, as well as higher scores in the Salt Restriction subscale ($p<.05$). Although the differences were not statistically significant in other subscales—namely Healthy Habits, Sugar Restriction, and Prevent Retention—their scores were also consistently higher, indicating a positive behavioural trend. These results suggest that adherence to a special diet may be associated not only with salt reduction, which is frequently emphasized in HF management, but also with broader improvements in dietary behaviour. While the effect sizes were small ($d=0.005$ for total score; $d=0.014$ for salt restriction), they nonetheless reinforce the potential value of structured dietary planning in supporting nutritional self-care. To our knowledge, this is one of the first studies in Türkiye to demonstrate these associations using a validated dietary behaviour scale. These findings highlight a critical gap between clinical recommendations and patient behaviour and emphasize the importance of encouraging special diet adherence through tailored counselling in HF care.

Regular meal consumption in patients with HF is critical for disease management. In our study, it was observed that most of the patients had the habit of consuming regular meals, but some participants skipped meals for reasons such as 'lack of habit' and 'lack of appetite'. Skipping meals may lead to disturbances in blood glucose regulation, energy deficiency and negative eating behaviours such as overeating at the next meal (28). This may adversely affect the course of the disease by making it difficult to control fluid and sodium intake in heart failure. Therefore, it is extremely important for individuals with heart failure to maintain regular meal consumption, develop individual solutions to minimise the reasons for skipping meals, and receive support from healthcare professionals in this regard in terms of disease management and improving quality of life. In support of this, our findings also indicated a positive trend between meal frequency and dietary behaviour scores. As the number of daily meals increased, both the total SDBHF score and the Salt Restriction subscale score tended to be higher, although the differences did not reach statistical significance. This trend suggests that regular meal consumption may be associated with greater adherence to dietary recommendations, particularly in areas such as sodium control, which is critical in HF management. While the relationship was not statistically significant, the consistency of this behavioural pattern reinforces the potential value of meal regularity as a modifiable target in dietary counselling. To our knowledge, few studies have examined this association using a validated dietary behaviour scale in a HF population, making this an important contribution to understanding the role of meal patterns in nutritional self-care.

Appetite and weight loss are frequently reported in patients with HF (29). This has been associated with metabolic and hormonal effects of heart failure (30). In this context, Arslan

et al. (2023) reported that both underweight and obese patients with acute coronary syndromes had higher GRACE risk scores, suggesting that extremes of body composition may reflect worse prognosis. This highlights the importance of monitoring anthropometric indicators and adjusting nutritional strategies accordingly in patients with HF (31). Especially loss of appetite may decrease the quality of life by increasing the risk of nutritional deficiency in patients. In addition, chewing and swallowing difficulties are common problems in patients with heart failure, which may make food intake more difficult (32). Digestive system problems such as indigestion, bloating, diarrhoea and constipation are generally associated with side effects of the drugs used, low physical activity level and inadequate fluid and fibre intake (33,34,35). These symptoms may limit patients' activities of daily living and worsen their nutritional status. Therefore, early diagnosis of such problems in individuals with heart failure, development of personalised nutrition plans and multidisciplinary approaches for symptom management are very important. These problems may be caused by several interrelated factors, including advanced age, medication side effects (e.g., diuretics, ACE inhibitors), poor oral health, fatigue, or depressive symptoms—all of which are prevalent among patients with chronic heart failure. From a clinical perspective, these issues may result in inadequate energy and nutrient intake, weight loss, and ultimately malnutrition, which is a known predictor of poor prognosis, higher readmission rates, and increased mortality in HF patients. Addressing these barriers through multidisciplinary approaches—including dental care, appetite-stimulating strategies, and appropriate food texture modifications—may help improve dietary intake and overall health outcomes.

In our study, symptom-specific analyses provided further insights into how common physiological problems in HF may affect dietary behaviours. Participants who reported chewing difficulties after HF diagnosis had lower scores in the total SDBHF and all subscales, with a statistically significant decrease observed in the Prevent Retention subscale ($p<.05$, $d=0.009$). This finding suggests that chewing difficulties may particularly impair behaviours aimed at managing fluid and sodium retention. Conversely, patients reporting diarrhoea had higher scores in all domains, with a statistically significant increase in the Healthy Habits subscale ($p<.05$, $d=0.023$), possibly reflecting increased dietary awareness in response to digestive discomfort. Finally, individuals experiencing constipation had lower total and subscale scores, with a significant reduction again in the Prevent Retention subscale ($p<.05$, $d=0.033$). While other differences in each symptom group were not statistically significant, the consistent directional trends observed highlight the potential impact of gastrointestinal and oral symptoms on patients' ability to follow recommended dietary practices. To our knowledge, this is one of the first studies to examine these associations in detail using a validated dietary behaviour scale in HF patients. These findings reinforce the importance of early identification of such symptoms and the integration of tailored nutritional strategies—such as texture-modified diets and symptom-specific counselling—into heart failure management.

Beyond their impact on dietary behaviours, limiting factors such as chewing difficulties, constipation, and diarrhoea may also contribute directly to compromised nutritional status. For instance, chewing difficulties can reduce overall food intake and lead to avoidance of nutrient-dense, high-fibre, or protein-rich foods. Constipation may reduce appetite and delay gastric emptying, further limiting caloric and micronutrient intake. Diarrhoea, while sometimes prompting healthier eating behaviours, may also cause malabsorption and loss of fluids, electrolytes, and nutrients. Although our study focused primarily on behavioural outcomes, the observed patterns suggest a potential pathway through which these symptoms may contribute to malnutrition risk. Future research should investigate how symptom-specific dietary behaviour changes correlate with objective measures of nutritional status, such as BMI, serum albumin levels, or muscle mass.

4.1. Strengths and Limitations

Scale for Dietary Behaviours in Heart Failure used in this study constituted the strength of this study because it had not been used before, but it was quite limiting in the discussion of the findings.

Cronbach's alpha value of the SDBHF used in our study was 0.58. A higher internal consistency of the scale would have provided more robust and reliable results. This relatively low alpha value may be attributable to cultural or contextual differences in dietary behaviour expressions among patients with HF. This represents a notable methodological limitation and may affect the reliability of subgroup comparisons and the interpretation of observed differences. Therefore, further validation and possible revision of the scale is recommended in future studies to enhance its reliability and applicability in different populations. Additionally, conducting item-level analysis or exploratory factor analysis may help identify specific items that reduce internal consistency and support scale refinement efforts.

In addition, the study was conducted in a single tertiary care hospital located in one region of the country, which may limit the generalizability of the findings to broader populations with different sociodemographic or healthcare access characteristics. Future research involving multicenter and regionally diverse samples is needed to confirm the representativeness and transferability of these results to other settings.

Although data on age, sex, marital status, education and income were collected, more nuanced indicators of cultural and ethnic diversity were not explored, which may limit the interpretation of dietary behaviours in broader sociocultural contexts.

Moreover, although a standardized protocol was used during interviews, the face-to-face data collection method may have

introduced social desirability bias. In addition, the use of self-reported data to assess dietary behaviors may introduce recall bias or reporting bias, as participants might underreport or overreport certain habits. Although interviews were conducted face-to-face using a standardized protocol, the reliance on self-reports remains a methodological limitation that could affect data accuracy.

Another important limitation is the cross-sectional design of the study, which does not allow for causal inferences. Although associations between dietary behaviors and socio-demographic or clinical variables were identified, the directionality or causality of these relationships cannot be established.

5. CONCLUSION

Based on the specific findings of this study, several clinically relevant implications can be drawn to enhance dietary management in patients with heart failure. First, the observation that patients with comorbid hypertension and diabetes demonstrated higher adherence to salt and sugar restriction respectively suggests that nutrition counselling should be tailored to reflect these coexisting conditions. Incorporating comorbidity-specific dietary goals may increase patient motivation and engagement. Second, the negative association between smoking duration and dietary adherence—particularly in sugar restriction and fluid management—underscores the need to integrate nutritional education with smoking cessation strategies, particularly among long-term smokers. Third, symptoms such as chewing difficulty and constipation were associated with lower scores in the fluid retention subscale, highlighting the importance of symptom screening and the use of texture-modified or fiber-adjusted diets. Additionally, the positive association between snack consumption and healthy dietary habits supports the inclusion of structured, nutrient-rich snacks in dietary planning. The data also revealed that patients who adhered to special diets, particularly salt-restricted or diabetic diets, showed better overall dietary behaviours, reinforcing the value of individualized dietary prescriptions. Skipping meals—especially lunch—due to lack of appetite or routine was associated with lower adherence, suggesting the need for behavioural strategies to support meal regularity. Furthermore, lower education and income levels were associated with poorer dietary scores, indicating that simplified educational tools and culturally adapted materials may benefit socioeconomically disadvantaged groups. Although the effect sizes observed in many associations were small, their cumulative impact may hold clinical relevance. Therefore, a comprehensive and multidisciplinary approach—incorporating comorbidity management, behavioural support, nutrition education, and symptom-specific interventions—should be adopted to improve dietary behaviours and, consequently, health outcomes in patients with heart failure.

Based on the findings of this study, it can be concluded that there is a need for improved and individualized dietary planning in heart failure patients. Developing personalized and guideline-based nutrition interventions tailored to the specific needs and clinical conditions of HF patients is essential for effective disease management and improving quality of life. To put these recommendations into practice, structured nutrition education programs should be developed not only for HF patients but also for their families and caregivers. Including dietitians as integral members of multidisciplinary care teams could enhance the effectiveness of dietary interventions. In addition, incorporating routine dietary behavior assessments into follow-up visits can help monitor progress and tailor interventions. On a broader level, institutional policies, such as adjusting hospital food menus to align with HF-specific dietary guidelines, could support sustainable dietary changes.

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Design of the study: DMD, YKU
Acquisition of data for the study: ZTB, AA
Analysis of data for the study: DMD
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