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THE RELATIONSHIP OF NUTRITION AND WALKING WITH BODY COMPOSITION, ANXIETY AND SLEEP QUALITY IN HEALTHY ELDERLY OVER 65

POVEZAVA MED PREHRANO IN HOJO S TELESNO SESTAVO, ANKSIOZNOSTJO IN KAKOVOSTJO SPANJA PRI ZDRAVIH STAREJŠIH, STAREJŠIH OD 65 LET

ABSTRACT

The aim of this study is to investigate the effects of healthy eating practices and walking exercise on body composition, anxiety and sleep quality in the elderly over 65 years of age. Participants (n=30) were randomly divided into experimental and control groups. Individualized medical nutrition treatments were prepared by a specialist dietitian for 12 weeks and regular follow-ups were made on a weekly basis for the experimental group. In addition to the nutrition and diet program, the experimental group was given walking exercise for 45 minutes, 3 days a week for 12 weeks. Body composition measurements of all participants were taken at the beginning and end of the study, Three Factor Eating Questionnaire, Hamilton Anxiety Rating Scale, Katz Activities of Daily Living Scale and Pittsburg Sleep Quality Scale were applied. There was no statistically significant difference in terms of body composition, anxiety and sleep quality in the healthy elderly group in which walking exercise and personalized nutrition therapy were applied. A statistically significant difference was found in terms of Hamilton scores with regard to the processes in those who didn’t exercise (Z=-2.913; p=0.010) and the post-test Hamilton scores of those who didn’t exercise were significantly lower than the first test.

Keywords: Elderly nutrition, walking, obesity, sleep quality, anxiety, eating attitude

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IZVLEČEK

Namen te študije je bil raziskati učinke zdrave prehrane ter vadbe s hojo na telesno sestavo, anksioznost in kakovost spanja pri starostnikih nad 65 let. Udeleženci (n=30) so bili naključno razdeljeni v eksperimentalno in kontrolno skupino. Individualizirane prehranske terapije je pripravljal dietetik 12 tednov za obe skupini. Eksperimentalna skupina je poleg prehranskega in dietnega progama 12 tednov izvajala tudi vadbo (hojo) 3 dni v tednu, vsakič po 45 minut ter tedenske kontrolne preglede. Pred začetkom in ob koncu študije so od vseh sodelujočih pridobili podatke s pomočjo tri-faktorskega vprašalnika o prehranjevanju, Hamiltonove lestvice za ocenjevanje anksioznosti, Katzove lestvice vsakodnevnih aktivnosti, Pittsburškega vprašalnika o kakovosti spanja in s pomočjo meritev telesne sestave. V eksperimentalni skupini ni bilo ugotovljenih nobenih statistično pomembnih razlik med začetnimi in končnimi meritvami. Do statistično pomembnih razlik pa je prišlo v kontrolni skupini (Z=-2.913; p=0.010), kjer se je zgodil upad med začetnimi in končnimi meritvami pri oceni anksioznosti s pomočjo Hamiltonove lestvice.

Ključne besede: prehrana starejših, hoja, debelost, kakovost spanja, anksioznost, prehranjevalne navade

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INTRODUCTION

Elderliness is defined as the progressive decline of functions at the cell, tissue, organ and body level, which begins with biochemical reactions in the cell with the effect of hereditary structure and external factors (Štefan et al. 2018). Improving health services in the world, healthy nutrition practices, physical activity, and increasing basic health services such as vaccination and sanitation gradually lead to a prolongation of life expectancy and an increase in the elderly population (Štefan et al. 2018; Fern et al. 2009). When elderliness is evaluated chronologically, it is defined as an individual aged 65 and over in western countries (Warburton et al. 2006). According to the 2018 Turkey Demographic and Health Survey (TDHS) data, Turkey still has a young population structure, but the share of the elderly population in the total population increased. The ratio of the number of individuals aged 65 and over to the general population in Turkey reached 10% (TNSA, 2018). According to the "Global Strategy and Action Plan on Aging and Health" report published by the World Health Organization in 2015, the number of people aged 60 and over, which was 600 million in 2000, is expected to increase to 1.2 billion in 2025 and to two billion in 2050. This information indicates that the number of elderly individuals in societies is increasing and will increase more over time (Troiano et al. 2007; Allender et al. 2008). Depending on this increase, the tendency to basic issues such as the health problems of old age and the solutions of these problems increased and healthy nutrition and exercise were indicated as the most important factor in maintaining health and increasing the quality of life (Štefan et al. 2018; Fern et al. 2009; Troiano et al. 2007).

The fact that individuals acquire adequate, balanced and correct dietary habits and be physically active is effective in maintaining a healthy body weight, reducing the risk of chronic diseases and increasing the quality of life (Štefan et al. 2018). A healthy diet in the elderly is thought to prevent the progression of geriatric symptoms and chronic diseases (Pronk et al. 2004). Obesity, diabetes, oral/dental health diseases and various cancers are the leading diseases associated with nutrition in the elderly (Marengoni et al. 2011). With the advancing age, energy requirement of individual decreases. This decrease is thought to be 5% per decade after the age of 50. The reason for the decrease in energy that is burnt is the changes in body composition. In elderliness, there is an increase in body fat tissue and a decrease in lean body mass or muscle density (sarcopenia). Muscle cell metabolism and body proteins decrease. Accordingly, basal metabolic rate and therefore the energy requirement decrease (Pearson et al. 2009; Ottevaere et al. 2011; Jezewska-Zychowicz et al. 2018). Decreased physical activity and capacity to work result in a reduction in energy requirement. Obesity, cardiovascular diseases, musculoskeletal diseases and osteopenia that occur with aging also reduce physical activity. Decreased physical activity with aging and decreased basal metabolic rate (BMR) with slowed muscle movements reduce the energy requirement. Consumption of food more than needed during this period causes obesity. Obesity is a risk factor for hypertension, hyperlipidemia, diabetes, cardiovascular diseases, some cancer types and osteoarthritis (Jezewska-Zychowicz et al. 2018; Bibiloni et al. 2017). Additionally, obesity reduces mobility and reduces the quality of life by preventing activities of daily living, making the individual dependent on a bed or chair. The mortality rate in obese individuals is higher than in non-obese individuals (Talegawkar et al. 2012). It was reported by the World Health Organization that approximately 39% of the elderly are overweight and 13% are obese, and these rates are expected to increase in the coming years (Newman et al. 2001). Overweight and obesity are modifiable conditions that can be prevented with lifestyle interventions intended to improve dietary habits and physical exercise. It is crucial to initiate effective education and intervention programs to promote better health status of the elderly. This also means that it is necessary to better understand what elderly consumers think, how they make decisions about food, nutrition and health, and which sources they trust most (Štefan, et al. 2018). Among the factors affecting the food consumption of elderly individuals are physiological, psychological and physical changes in the body (Zhang and Zhao 2021). Reasons such as decreased taste/smell, chewing/swallowing difficulties, tooth loss, poor appetite, neuropsychiatric diseases, decrease in socio-economic status, decreased sleep quality, depression and anxiety as well as aging prevent food consumption of the elderly and cause malnutrition (Zhang and Zhao 2021; Tucker 2021). Regular evaluation of nutritional status is of great importance in the elderly group who have a high risk of malnutrition (Tucker 2021).

In addition to adequate and balanced nutrition, physical activity is important for the protection and development of health in the elderly. With aging, some changes occur in the neuromuscular system, and depending on these changes, muscle strength and motor performance decrease. It is estimated that there is a 3% decrease in muscle strength each year in advanced ages, especially between the ages of 70-79. It was reported that with this decrease, there may be a decrease in the functional capacity and quality of life of the elderly, and an increase in the risk of falling and mortality (Tucker 2021). It is important to do regular exercises to increase muscle strength and performance in preventing or slowing down sarcopenia that is experienced with aging (Zhang and Zhao 2021). Moreover, physical activity has positive effects on maintaining/gaining healthy body weight, regulation of blood lipid profile, blood pressure and coagulation factors (Newman et al. 2001; Jang et al. 2021). Sleep quality decreases in the elderly due to hormonal and physiological changes. Sleep disorders, loneliness, fear of death and an inactive lifestyle cause depression in the elderly. Literature studies show that changes in physical activity and nutrition help improve sleep quality and mood of anxiety (Jezewska-Zychowicz et al. 2018).

When planning nutrition in the elderly; it should be aimed both to consider the frequently encountered nutrient deficiency situation and to prevent chronic diseases and to provide medical nutrition therapy according to their needs (Tanaka et al. 2021). Good nutrition and physical activity are very important for healthy aging physically and psychologically. A multidisciplinary approach is required to maintain the quality of life and to minimize the complications that may occur with aging (Kim et al. 2021). There are studies examining food consumption and physical activity levels in elderly individuals and their effects on anthropometric measurements and blood parameters. However, there are no studies in which individualized nutrition program is evaluated weekly and their effects on the body are examined. In this context, the aim of this study is to investigate the effects of healthy nutrition practice and walking exercise on body composition, anxiety and sleep quality in the elderly, the effectiveness and benefits of which are frequently reported in the literature.

METHODS

Participants

A total of 30 volunteers who applied to a nutrition and diet center in the province of Karabük, Turkey and received healthy nutrition consultancy service and whose age average is 66.33±2.87, participated in the study. The participants in this study were randomly separated into two groups as exercising (n=15) and non-exercising (n=15). Individualized medical nutrition therapies were prepared by specialist. In addition to the nutrition and diet program, the groups were determined as those who did walking exercise 3 days a week and 45 minutes a day for 12 weeks (n: 15) and those who only participated in the nutrition and diet program and did not do walking exercise (n: 15). The individuals with malignancies who would not be able to adapt to the nutritional program or those who follow a specific diet and have serious chronic kidney, heart or endocrine diseases and the individuals under the age of 65 were not included in the study. Ethics committee approval was obtained for the study from Karabuk University, Non-Interventional Clinical Research Ethics Committee with the decision numbered

05.08.2021-E48871. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Instruments

Within the scope of the study, a questionnaire containing personal information, nutritional status and habits, general health status and physical activity records was applied to the participants by the researcher. In addition to the socio-demographic characteristics and dietary habits questionnaire, the Katz Activities of Daily Living Scale for activities of daily living and physical activity status, the Three-Factor Eating Questionnaire (TFEQ-R21) for determining dietary habits, the Pittsburg Sleep Quality Scale (PSQI) for determining sleep quality, and the Hamilton Anxiety Rating Scale for assessment of anxiety and psychological state were administered to the participants both at the beginning of the study (pre-test) and in the end of 12 weeks (post-test). In the beginning of the study, the participants (2 people) who could not adapt to nutritional therapy were excluded from the study. After the participants were given general information about the study, their declarations that they accepted the study on a voluntary basis were obtained with the "Informed Consent Form for Study for Research Purposes".

Anthropometric Measurements: While the height (cm) of the participants were measured with a stadiometer; body weight (kg), body mass index (BMI) (kg/m^2), body fat percentage (%) and body muscle percentage (%) were measured using the Inbody 120 body analyzer. Information about the general health status of the participants, the drugs and nutritional supplements their use were recorded. While a stadiometer was used to measure the height (cm) of the participants, a bioelectrical impedance analysis measuring device was used to measure body weight (kg), body mass index (BMI) (kg/m^2), body fat percentage (%) and body muscle percentage (%).

The Three-Factor Eating Questionnaire (TFEQ-R21): In this study, TFEQ-R21 was applied to determine the psychological eating behaviors of the individuals. TFEQ (Three-Factor Eating Questionnaire) was first developed by Stunkard and Messick in 1985 to measure the behavioral and cognitive components of eating (Stunkard et al.,1985). Later, TFEQ was revised as an 18-item 3-factor scale (TFEQ-R18) by Karlsson et al. in 2000, then revised again and a 21-item scale form (TFEQ-R21) was used (Karlsson et al. 2000). The Turkish validity and reliability study of the questionnaire was conducted by Karakuş et al. in 2016 (Karakuş et al. 2016). While the lowest score that can be obtained from the restrictive eating sub-factor of the scale is 9 and the highest score is 36, the lowest score that can be obtained from the cognitive restriction and emotional eating sub-factors is 6, and the highest score is 24. In the TFEQ-R21 Three-Factor Eating Behavior Scale, which was prepared with a five-point Likert scale consisting of 3 dimensions and 21 items, to determine eating behaviors, the cognitive restriction dimension is measured with 6 items, the emotional eating dimension with 6 items, and the uncontrolled eating dimension with 9 items. In this study, the Cronbach's alpha value of the scale was found to be 0.835 for the first measurement and 0.762 for the last measurement.

The Hamilton Anxiety Rating Scale: This scale developed by Hamilton is used to measure the severity of anxiety. It measures depressive symptoms including spiritual and somatic anxiety. In this scale, which consists of 14 sections, the existence and severity of the sections are based on the interviewee’s opinion at the time of the interview. Grading is performed with the help of a scoring system between 0 and 4 determined separately for each symptom (Hamilton et al. 1986). The Turkish validity and reliability study was performed by Yazıcı et al. (Yazıcı et al. 1998). In this study, the Cronbach's alpha value of the scale was found to be 0.840 for the first measurement and 0.718 for the last measurement.

The Katz's Activities of Daily Living (ADL) Scale: The ADL scale, developed by Katz et al. in 1963, determines the activities aimed at providing the basic requirements necessary for the continuation of life. The ADL scale was translated into Turkish by Yardimci (1995). The scale includes the scores of the values necessary to determine daily living activities such as bathing, dressing, toilet, movement, continence, and nutrition. The ADL scale is evaluated in a way in which 0-6 points mean dependent, 7-12 points mean semi-dependent, 13-18 points mean independent. In the Katz ADL scale, there are independent, partially dependent, and dependent response options under each heading. The scale tests six basic activities: bathing, dressing, toileting, transfer, continence, and nutrition (Katz et al. 1995).

The Pittsburg Sleep Quality Scale (PSQI): It was developed by Buysse et al. and adapted into Turkish by Ağargün et al. PSQI is a 19-item self-report scale that assesses sleep quality and disorder in the past month. It consists of 24 questions; 19 questions of which are self-report questions, and 5 questions of which are questions to be answered by the spouse or roommate. The 18 scored questions of the scale consist of 7 components. Subjective Sleep Quality, Sleep Latency, Sleep Duration, Habitual Sleep Efficiency, Sleep Disorder, Sleeping Pill Use, and Daytime Dysfunction. Each component is evaluated over 0-3 points. The total score of the 7 components gives the scale total score. The total score ranges from 0 to 21. A total score greater than 5 indicates “poor sleep quality” (Buysse et al. 1989; Ağargün et al. 1996).

Planning of Nutrition and Diet Program: An individualized nutrition program, which was not below the basal metabolic rate (BMR) of the individual, was prepared for each participant by a nutrition and diet specialist taking into account the results of body analysis (body fat, muscle mass, body water ratios), lifestyle and dietary habits, and their daily energy needs and consumption. The content of the nutrition program was planned in a way in which the carbohydrate (CHO) rate was 55-60%, the protein rate was 15-20%, or the protein content was at least 1.5 g/kg per day, the fat rate was between 25-35%, and the daily water consumption was 30-35 ml per kg. Weekly face-to-face interviews were conducted with the participants in both groups, body analyzer measurement was performed by the researchers every week, and the nutrition program was changed within the planned standards.

Planning the Walking Exercise: The group performing the walking exercise was given walking exercise for 12 weeks, 3 days a week, 45 minutes a day at 40-60% of target heart rate. The participants warmed up for 5-10 minutes before starting the exercise and stretched for 5-10 minutes in the end of the exercise. Calculating the severity of the exercise: The target heart rate was determined according to the heart rate reserve (Karvonen) method as a result of a 10-second heartbeat count from the carotid artery in the neck immediately after the end of exercise (Fox et al. 1999; Tamer 2000).

Statistical Analysis

SPSS 23.0 package program was used for data analysis. The demographic characteristics of the participants (gender, age) were given as frequency and percentage. The average scores of the scales were obtained and the compatibility of their distribution with the normal distribution was examined with the Kolmogorov Smirnov test. Because the distributions did not meet the normality condition, the average score values of all scale levels were obtained and the Mann Whitney-U test was used for comparisons in regard to the groups. While examining the relationships between the scales and the continuous variables that may be important, the Spearman relationship test was used. The Repeated Measures ANOVA and Bonferroni analyzes were applied to to determine whether there was a difference in the In-group and between-groups, pre-test and post-test comparisons. The statistical significance level was accepted as $p<0.05$.

RESULTS

Thirty individuals, 26 women and 4 men, were included in the study. 80% of the participants who did the exercise and 93% of the participants who did not do sports are women. No statistically significant relationship was found between the groups in terms of sex, marital status, educational level, employment status, health status, the place where nutritional information was obtained, health problem, mouth/dental problem, and medicine use status ($p>0.05$).

Table 1. Examination of the relationships by groups and some variables.

Variable / Group	Exercising (n=15)		Non-exercising (n=15)		Statistical analysis* Probability
	n	%	n	%	
Sex					
Female	12	80.0	14	93.3	p=0.598
Male	3	20.0	1	6.7	
Marital status					
Married	3	20.0	3	13.3	p=1.000
Single	12	80.0	13	86.7	
Educational level					
Primary school and lower levels	10	66.7	7	46.7	χ^2=0.543
Secondary school and upper levels	5	33.3	8	53.3	p=0.461
Employment status					
Yes	1	6.7	1	6.7	p=1.000
No	14	93.3	14	93.3	
Health status					
Good	13	86.7	10	66.7	p=0.390
In-between	2	13.3	5	33.3	
Nutritional inf.					
Dietitian	4	26.7	3	20.0	
Doctor	5	33.3	5	33.4	
Nurse	-	-	2	13.3	χ^2=2.343
Radio and TV	3	20.0	2	13.3	p=0.673
Newspaper	3	20.0	3	20.0	
Health problem					
Yes	6	40.0	5	33.3	p=0.960
No	9	60.0	10	66.7	
Mouth/dental problem					
Yes	5	33.3	3	20.0	p=0.682
No	10	66.7	12	80.0	
Mouth/dental problem					
Decayed/missing tooth	2	40.0	1	33.3	χ^2=0.178
Palate problem	2	40.0	1	33.3	p=0.915
Denture and artificial teeth	1	20.0	1	33.3	
Medicine use status					
Yes	6	40.0	5	33.3	p=0.960
No	9	60.0	10	66.7	

* In examining the relations between two qualitative variables, "Fisher-Exact", "Continuity correction" and "Pearson-χ2" crosstabs were used depending on the expected value levels.

Table 2 shows the comparison of some parameters by groups. No statistically significant difference was found between the groups in terms of age, weight (initial), weight (final), height, BMI (initial), BMI (final), fat ratio (initial), fat ratio (final), muscle ratio (initial), muscle ratio (final), kcal burned (initial), kcal burned (final), fat percentage (%) (initial), and fat percentage (%) (final) (p>0.05). No statistically significant difference was found between the groups in terms of protein (initial) values (p>0.05). A statistically significant difference was found between the groups in terms of protein (final) values (t=3.601; p=0.001). The protein (final) values of those who did exercise are significantly higher than those who did not exercise. A statistically significant difference was found between the groups in terms of CHO ratio (%) (initial) values (t=-2.584; p=0.015). The CHO ratio (%) (initial) values of those who did exercise are significantly lower than those who did not do sports. A statistically significant difference was found between the groups in terms of CHO ratio (%) (final) values (Z=-2.262; p=0.024). The CHO ratio (%) (final) values of those who did exercise were found to be significantly lower than those who did not do sports.

Table 2. Comparison of some variables by groups.

Variable	**Exercising (n=15)**		**Non-exercising (n=15)**		**Statistical analysis* Probability**
	$\bar{X} \pm S.D.$	**Median [Min-Max]**	$\bar{X} \pm S.D.$	**Median [Min-Max]**	
Age	66.33±2.87	65.0 [62.0-70.0]	65.87±3.38	65.0 [59.0-70.0]	Z=-0.378 p=0.705
Weight *(initial)*	73.83±12.73	73.0 [57.1-98.3]	76.87±11.42	76.0 [57.8-94.3]	t=-0.688 p=0.497
Weight *(last)*	71.14±13.07	71.0 [53.1-96.3]	74.50±10.98	72.4 [54.2-90.9]	t=-0.762 p=0.452
Height	163.80±8.96	165.0 [145.0-183.0]	160.20±7.83	160.0 [148.0-175.0]	t=1.172 p=0.251
BMI *(initial)*	27.66±5.20	25.3 [21.0-36.1]	30.33±6.23	31.6 [18.9-39.3]	t=-1.275 p=0.213
BMI *(last)*	26.64±5.20	24.3 [19.5-35.4]	29.41±6.03	30.5 [17.7-37.3]	t=-1.347 p=0.189
Fat ratio *(initial)*	33.58±6.92	32.4 [21.8-48.7]	32.27±4.35	32.4 [26.9-39.7]	t=0.622 p=0.539
Fat ratio *(last)*	31.51±6.68	32.1 [19.4-44.2]	30.27±5.37	30.2 [22.8-39.3]	t=0.560 p=0.580
Muscle ratio *(initial)*	27.01±5.46	26.0 [20.2-37.8]	28.38±5.64	28.3 [19.4-36.8]	t=-0.675 p=0.505
Muscle ratio *(last)*	27.52±5.60	26.5 [20.6-38.3]	28.89±5.67	29.4 [19.8-36.6]	t=-0.668 p=0.510
kcal burned *(initial)*	2214.80±382.08	2190.0 [1713.0-2949.0]	2306.00±342.57	2280.0 [1734.0-2829.0]	t=-0.688 p=0.497
Kcal burned *(last)*	1763.33±328.71	1750.0 [1330.0-2400.0]	1664.00±274.47	1610.0 [1155.0-2080.0]	t=0.898 p=0.377
Protein *(initial)*	15.60±1.80	15.0 [13.0-19.0]	14.27±2.22	15.0 [10.0-18.0]	t=1.805 p=0.082
Protein *(last)*	24.27±2.49	24.0	21.07±2.37	20.0	t=3.601

		[19.0-29.0]		[17.0-25.0]	**p=0.001**
CHO ratio (%) *(initial)*	54.93±1.67	55.0 [52.0-58.0]	56.73±2.12	56.0 [54.0-60.0]	t=-2.584 **p=0.015**
CHO ratio (%) *(last)*	46.47±3.50	46.0 [42.0-57.0]	48.00±2.24	49.0 [44.0-51.0]	Z=-2.262 **p=0.024**
Fat percentage (%) *(initial)*	29.47±2.67	30.0 [25.0-34.0]	29.00±3.09	29.0 [24.0-36.0]	t=0.442 p=0.662
Fat percentage (%) *(last)*	29.27±3.58	30.0 [24.0-34.0]	30.93±3.53	31.0 [25.0-38.0]	t=-1.284 p=0.210

* "Independent Sample-t" test (t-table value) statistics were used to compare the measurement values of two independent groups with normal distribution. "Mann-Whitney U" test (Z-table value) statistics were used to compare the measurement values of two independent groups without a normal distribution.

When the three-factor eating scale scores were compared between the groups, no statistically significant difference was found in terms of the pre-test and post-test uncontrolled eating scores (p>0.05). No statistically significant difference was found in uncontrolled eating scores of those who did exercise in terms of processes (p>0.05). No statistically significant difference was found in uncontrolled eating scores of those who did not do exercise in terms of processes (p>0.05). No statistically significant difference was found between the groups in terms of pre-test and post-test cognitive restriction scores (p>0.05). No statistically significant difference was found in cognitive restriction scores of those who did exercise in terms of processes (p>0.05). No statistically significant difference was found in cognitive restriction scores of those who did not do exercise in terms of processes (p>0.05). No statistically significant difference was found between the groups in terms of pre-test and post-test emotional eating scores (p>0.05). No statistically significant difference was found in emotional eating scores of those who did exercise in terms of processes (p>0.05). A statistically significant difference was found in emotional eating scores of those who did not do exercise in terms of processes (Z=-2.585; p=0.010). The post-test emotional eating scores of those who did not do exercise were significantly lower than the pre-test (Table 3).

Table 3. Comparison of the three-factor eating scale scores by groups.

Group / Variable	Exercising (n=15)		Non-exercising (n=15)		Statistical analysis* Probability
	$\bar{X} \pm$ S.D.	**Median [Min-Max]**	**$\bar{X} \pm$ S.D.**	**Median [Min-Max]**	
Uncontrolled eating					
Pre-test	60.24±6.02	63.0 [48.2-70.4]	57.78±6.23	59.3 [40.7-66.7]	Z=-1.080 p=0.280
Post-test	59.01±8.10	63.0 [44.4-70.4]	55.31±8.10	55.6 [40.7-70.4]	t=1.252 p=0.221
Statistical analysis Probability	t=0.837 p=0.417		Z=-1.563 p=0.118		
Cognitive restriction					
Pre-test	67.04±11.96	72.2 [44.4-83.3]	62.96±7.17	61.1 [50.0-72.2]	t=1.131 p=0.268
Post-test	68.52±14.49	77.8 [38.9-83.3]	62.59±8.78	61.1 [50.0-77.8]	Z=1.638 p=0.101
Statistical analysis Probability	Z=-0.893 p=0.372		t=0.292 p=0.774		
Emotional eating					
Pre-test	54.07±21.15	61.1 [33.3-83.3]	52.59±18.05	55.6 [33.3-77.8]	Z=-0.326 p=0.744
Post-test	52.59±25.79	61.1 [22.2-88.9]	47.41±21.50	50.0 [11.1-77.8]	Z=-0.418 p=0.676
Statistical analysis Probability	Z=-0.921 p=0.357		Z=-2.585 **p=0.010**		

* While the "Independent Sample-t" test (t-table value) was used to compare two independent groups with normal distribution in terms of measurement values, the "Paired Sample" test (t-table value) statistics were used to compare two dependent groups. While the "Mann-Whitney U" test (Z-table value) was used to compare two independent groups not normally distributed in terms of measurement values, the "Wilcoxon" test (Z-table value) statistics were used to compare two dependent groups.

Table 4 shows the comparison of the three-factor eating scale scores by groups. No statistically significant difference was found between the groups in terms of pre-test KATZ scores (p>0.05). No statistically significant difference was found between the groups in terms of post-test KATZ scores (p>0.05). No statistically significant difference was found between the KATZ scores of those who did exercise in terms of processes (p>0.05). No statistically significant difference was found between the KATZ scores of those who did not do exercise in terms of processes (p>0.05). No statistically significant difference between the groups in terms of pre-test and post-test Hamilton scores (p>0.05). No statistically significant difference was found between the Hamilton scores of those who did exercise in terms of processes (p>0.05). A statistically significant difference was found between the Hamilton scores of those who did no do exercise in terms of processes (Z=-2.913; p=0.010). The post-test Hamilton scores of those who did not do exercise were significantly lower than the pre-test.

Table 4. Comparison of the KATZ and Hamilton scale scores by groups.

Group / Variable	Exercising (n=15)		Non-exercising (n=15)		Statistical analysis* Probability
	$\bar{X} \pm S.D.$	**Median [Min-Max]**	**$\bar{X} \pm S.D.$**	**Median [Min-Max]**	
KATZ					
Pre-test	5.73±0.46	6.0 [5.0-6.0]	5.93±0.26	6.0 [5.0-6.0]	Z=-1.445 p=0.148
Post-test	5.87±0.35	6.0 [5.0-6.0]	6.00±0.00	6.0 [6.0-6.0]	Z=-1.439 p=0.150
Statistical analysis Probability	Z=-1.414 p=0.157		Z=-1.000 p=0.317		
Hamilton					
Pre-test	2.53±3.98	1.0 [0.0-12.0]	2.20±2.37	2.0 [0.0-10.0]	Z=-0.855 p=0.393
Post-test	1.80±2.37	1.0 [0.0-9.0]	1.20±1.74	1.0 [0.0-7.0]	Z=-0.738 p=0.460
Statistical analysis Probability	Z=-1.342 p=0.180		Z=-2.913 **p=0.004**		

* The "Mann-Whitney U" test (Z-table value) statistics were used to compare two independent groups not normally distributed in terms of the measurement values, the "Wilcoxon" test (Z-table value) statistics were used to compare two dependent groups.

Table 5 shows the comparison of PSQI scores by groups. No statistically significant difference was found between the groups in terms of pre and post-test PSQI scores (p>0.05). A statistically significant difference was found between the pre and post-test PSQI scores of those who did exercise (t=2.956; p=0.010). The post-test PSQI scores of those who did exercise were significantly lower than the pre-test. A statistically significant difference was found between the pre and post-test PSQI scores of those who did not do exercise (t=3.389; p=0.004). The post-test PSQI scores of those who did not do exercise were significantly lower than the pre-test. Additionally, as a result of the logistic regression analysis (in determining the risk of poor sleep quality), it was determined that variables such as group, sex, age, etc. do not affect the final poor sleep quality.

Table 5. Comparison of the PSQI scores by groups.

Group / Variable	Exercising (n=15)		Non-exercising (n=15)		Statistical analysis* Probability
	$\bar{X} \pm S.D.$	**Median [Min-Max]**	**$\bar{X} \pm S.D.$**	**Median [Min-Max]**	
PSQI					
Pre-test	7.33±3.66	7.0 [1.0-15.0]	7.00±3.87	7.0 [1.0-15.0]	t=0.242 p=0.810
Post-test	6.40±3.52	6.0 [0.0-13.0]	6.13±3.83	6.0 [1.0-14.0]	t=0.198 p=0.844
Statistical analysis Probability	t=2.956 **p=0.010**		t=3.389 **p=0.004**		

* While the "Independent Sample-t" test (t-table value) statistics were used to compare two independent groups with normal distribution in terms of the measurement values, the "Paired Sample" test (t-table value) statistics were used to compare two dependent groups.

DISCUSSION AND CONCLUSION

In our study, the groups were formed on a voluntary and eligibility basis. When the demographic data of the control and exercise groups were compared, we observed that there is no significant change in the values of age, height, weight, BMI, sex, marital status, employment status, health status, oral/dental problem, and medicine use. This indicates that the two groups are similar. In the comparison of the demographic data, a significant difference was found only in terms of educational levels between the control and exercise group.

For the elderly, regular and individualized exercises together with a healthy diet have an important place in the prevention and treatment of diseases. It is claimed that physically active individuals have better general health status, fewer movement restrictions and health expenses compared to sedentary individuals (Huang et al. 2021). At least 75% of the elderly do not exercise at the recommended level. Although the importance of proper nutrition for the elderly has been known for a long time, studies evaluating the effects of dietary habits on muscle and bone mass are relatively new. As growing older, there is a decrease in energy intake, which can reach up to 16-20% in the elderly over 65 years of age (Tanaka et al. 2021). Although older people's nutritional needs are generally higher, they consume less energy and protein compared to younger people (Kim et al. 2021). However, many health professionals express concern that protein-rich diets will increase and exacerbate kidney dysfunction in the elderly. There are numerous studies conducted to examine the effect of high dietary protein intake on muscle mass, physical performance, and anxiety (Kim et al. 2021; Liu et al. 2011). Some studies showed that dietary protein has a beneficial effect on muscle mass or physical performance in lean elderly people, while other studies found no effect of high protein intake on muscle mass, strength or performance in the elderly (Kim et al. 2021; Liu et al. 2011; Jamioł-Milc et al., 2021). These significant differences between studies may be due to differences in the study design, outcome measures, dietary protein strategy, and exercise plan. In this study, it was observed that those who did exercise consumed foods with higher protein and lower carbohydrate content than those who did not do exercise.

The prevalence of poor nutrition is increasing among the elderly, leading to poor health outcomes and increased mortality. A careful nutritional assessment is one of the key components of a comprehensive geriatric assessment to implement the necessary treatment plans to ensure successful aging in the elderly (Moradell et al. 2021. Studies are showing that doing exercise reduces symptoms related to eating disorders (Bulut et al. 2019). When the eating scale scores are compared between the groups in this study, there is no statistically significant difference between those who did exercise and those who did not, in terms of uncontrolled eating and cognitive restriction scores related to processes in the pre and post-test. While there is no significant difference in the emotional eating scores of those who did exercise, a statistically significant difference was found in terms of emotional eating scores of those who did not do exercise related to processes. The post-test emotional eating scores of those who did not do exercise were significantly lower than the pre-test.

Exercise provides positive effects on depressive symptoms by increasing ß-endorphin release and increasing the availability of neurotransmitters such as serotonin, dopamine and noradrenaline or brain-derived neurotrophic factors (Moradell et al. 2021). Numerous studies showed that individuals with an unhealthy diet experience higher rates of depression and anxiety disorders, and that there is a strong relationship between depression and obesity (Stunkard et al. 2018; Jang et al. 2021). In a study evaluating obesity and depressive disorder in the elderly, the prevalence of depression in the obese group was found to be 54.9% (Bulut et al. 2019). In the literature, it was reported that there is a negative relationship between regular exercise and depressive symptoms, and depressive symptoms decrease as regular exercise increases. Additionally, it was observed that individuals who do not exercise have an increase in depressive symptoms (Arpacı et al. 2015; Stunkard et al. 2018; Jang et al. 2021). While there is no statistically significant difference in terms of Hamilton scores of those who did exercise in the study, the post-test Hamilton scores of those who did not do exercise are significantly lower than the pre-test. The fact that a decrease in depressive disorders is observed in the elderly who do exercise supports the studies carried out. Long-term follow-up studies are needed in this regard.

There is a decrease in cognitive functions with old age and diseases brought by old age. This decrease in cognitive functions affects the activities of daily living and reduces the quality of life. Being independent is an important element in Katz's Activities of Daily Living (ADL) in order to perform functions such as taking roles in different areas of life, being productive and continuing to participate in society, and being physically active in old age (Katz et al. 1995; Jamioł-Milc et al. 2021). In the study conducted by Arpacı et al., the ability of elderly individuals to fulfill ADLs in terms of quality of life was examined. 15.8% of the participants stated that they had difficulty in eating and drinking, 15% in dressing, 9.2% in taking a bath, 7.6% in shopping, 13.4% in paying bills (Arpacı et al. 2015). In a study conducted with the elderly over 60 years of age, it was suggested that the quality of life in the physically active exercise group was higher than in the sedentary group (Jamioł-Milc et al. 2021). In the study of Daugherty et al. with 50 elderly people aged 60 and over, the effect of 12-week group-based exercise on quality of life was investigated. A statistically significant difference was found between the exercise group and the control group in all sub-parameters of the scale used for quality of life (Daugherty et al. 2012). In this study, when the level of independence was evaluated with the Katz Activities of Daily Living Scale, it was seen that both groups were independent and there was no significant difference in the pre and post-test. Although exercising in general increased the quality of life, no significant difference was found in our study. The averages show that the elderly individuals included in the study can continue their daily activities independently.

A score of 5 and above in the Pittsburg Sleep Quality Index means that the sleep quality is low. Recent studies on sleep and aging describe the interplay between the mechanisms that govern sleep, such as circadian rhythm, neurodegenerative processes, neurological diseases, and genetic factors associated with an aging population (Jones et al. 2018). Some studies have already shown that sleep quality decreases with aging. Thichumpa et al. (2018) investigated the sleep quality of the elderly, and found low sleep quality (PSQI score > 5) in approximately 44% of the participants, use of sleeping pills in 9.4%, poor family relationships in 27.1%, and mild depression in 12% (Thichumpa et al. 2018). Proper nutrition and physical activity are the factors affecting the quality of life and sleep. In this study, in which we determined walking as physical activity, a significant difference was found when the pre and post PSQI test values of the exercise group were compared, and the exercise program applied increased the sleep quality of the elderly.

Effective policies and programs should be developed to reduce the number of chronic diseases and improve the quality of life of the aging population (Poscia et al. 2017). Current policies and programs on aging should focus on identifying ways to increase quality and healthy years of life (Poscia et al. 2017; Thiamwong et al. 2008), because the problems experienced in the old age are the problems that can be prevented, delayed or identified and dealt with in the early period (Sparks et al. 2011). The World Health Organization (WHO) published “Active aging: a policy framework” in 2002 to prevent and delay chronic diseases and early graves and their risk factors (WHO, 2015). It is important to make the elderly adopt the health promotion approach that allows them to increase their control over their health and to accept healthy aging as a part of aging (WHO, 2015; Akın et al. 2015). Studies have shown that health-promoting behaviors not only reduce the development of chronic diseases, but also alleviate the consequences of chronic diseases (Alexandropoulou et al. 2010; Xu et al. 2015). Moreover, health-promoting behaviors provide better health outcomes in the remaining life of the elderly and contribute to increasing the quality of life (Van et al. 2015; Jahed et al. 2016). In their study, Kampmeije et al. determined that regular walking, healthy nutrition and adequate sleep affect the quality of life positively (Kampmeije et al. 2016). In their study with elderly individuals with chronic diseases, Feng et al. determined that there is a significant relationship between social participation, which is one of the health-promoting behaviors, and quality of life. In the study conducted by Niedermeier et al., it was determined that physical activity positively affects the quality of life (Feng et al. 2020; Niedermeier et al. 2019).

Considering the limitations of the study, preparing an individualized nutrition program for each participant and accordingly the low number of participants, the fact that the participants do not have serious health problems and applied to a dietitian in order to increase their quality of life and to be healthier may have caused the desired results not to be obtained in the scales we applied. The studies in the literature are those that are conducted in a hospital or nursing home environment, which are performed for a longer period of time compared to our study.

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Informed Consent

All participants included in the study were informed and their consent was taken before filling the questionnaire.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Appendix

Table 6. Distribution of findings regarding scales.

Scale (N=30)		**Number of items**	**Cronbach-α coefficient**
Initial measurement	Three-factor eating scale	21	0.835
	Hamilton scale	14	0.840
Final measurement	Three-factor eating scale	21	0.762
	Hamilton scale	14	0.718

When the reliability coefficient was examined, it was determined that the answers given to the scales were at a reliable level.