



Effect of Exercise and Nutritional Lifestyle Intervention on Weight Control and Behavior Change Processes in Among Inactive Older Adults

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Keywords

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ABSTRACT

The aim of this study; investigated the effects of an eight-week exercise and nutrition lifestyle intervention on weight control and behavior change processes in sedentary older adults with overweight obesity. They were assigned to a control group (18 women) aged ≥ 65 years with a body mass index (BMI (kg/m²) ≥ 30.00) or to a intervention group (17) undergoing an eight-week exercise lifestyle intervention. The behavioral attitudes of the participants before and after the intervention were determined with the Exercise Change Processes Scale (ECPS) and the Nutrition Change Processes Scale (NCPS). Descriptive statistics and T test were used in the research. Statistical significance was accepted as $P < 0.05$. There were no significant control group differences in any of the baseline values, but there were BMI and Body weight significant intervention group differences of the post-test values ($p < 0.00^*$). While there was a no significant ($p > .278$) difference in Helping Relationships according to comparison of pre-test and post-test measurements of the intervention group exercise change processes scale sub-dimensions, there were significant between-group differences in other of the baseline values ($p < 0.05^*$, $p < 0.001^*$). When comparing the pre-test and post-test measurements of the nutrition change processes scale sub-dimensions of the control and intervention groups, there are significant differences in all sub-dimensions in favor of the intervention group ($p < 0.05^*$, $p < 0.001^*$). In conclusion; Within the scope of ECPS and NCPS among inactive elderly individuals, it is aimed to prevent obesity in the elderly, improve health, and make people competent in improving and controlling their own health.



1. INTRODUCTION

The world population is aging, and the number of adults aged 65 and over is predicted to double to ~1.5 billion by 2050. Due to the concurrent increase in life expectancy, the number of people aged 80 and over is predicted to triple between 2019 and 2050 [1]. Owing to the modernization process occurring in recent years, significant changes in people's lifestyle have been observed, such as altered eating habits, reduced physical activity [2] and increased exposure time to sedentary behavior [3]. Sedentary behavior is an emerging problem and has been treated as a public health issue [4]. Increased exposure time to this behavior has been associated with several

deleterious health factors, such as all-cause mortality [5,6], depression [7,8], diabetes type [9,10], obesity [11], metabolic syndrome [12], cardiovascular diseases and certain types of cancer, reduced cardiorespiratory fitness, loss of muscle mass and strength and bone mass [13].

The prevalence of overweight and obesity is associated with increased psychophysical health problems and mortality. Therefore, there is a need to implement various public health interventions to reduce the prevalence of overweight and obesity in the obese population [14,15]. In recent years, the incidence of overweight and obesity has been increasing all over the world. This situation appears to affect not only adult men and women, but also children and teenagers. Unbalanced

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nutrition and lack of activity, which are the most important causes of obesity, are the second most common cause of preventable deaths in the world.

In addition, diseases that accompany the aging process, such as changes in eating habits due to senescence, which may lead to excessive or insufficient food consumption in this population, can also contribute negatively to health in the elderly. One health indicator in particular, overweight, characterized by a body mass index (BMI) greater than or equal to 25 kg/m² [15], has increased in prevalence worldwide [16]. However, little is known about the relationship between exposure time to sedentary behavior and nutritional status in the elderly.

Adequate and balanced nutrition is defined as taking the nutrients necessary for people's growth, development, survival and activities in the best way. People should consume foods in the right amounts, at the right times and consciously in order to protect and improve their health. Considering the benefits of exercise, optimal exercise makes individuals and society healthier [16,17]. It is important to gain healthy lifestyle behaviors such as changing eating behavior, nutrition and activity habits in obesity. Practicing regular physical activity is one of the healthy behaviors that brings benefits to physical, mental and social health. In this context, the goals in obesity are: Achieving weight loss, Maintaining the achieved weight, Using regulatory mechanisms against obesity and preventing relapses [16]. In the studies conducted, it is predicted that it is a guiding model with its theoretical framework in the content, implementation and evaluation of behavior change, nutrition and exercise interventions for obesity patients. Increasing physical activity levels in people with sedentary behavior produces health benefits [17,18]. This research; investigated the effects of an eight-week exercise and nutrition lifestyle intervention on weight control and behavior change processes in sedentary older adults with overweight obesity.

2. MATERIALS AND METHODS

2.1. Study Design

It is calculated by dividing the mean scores of the pre-contemplation, thinking, taking action and sustaining subscales by the number of items. To decide whether individuals are ready for change, the calculation is made as follows; It is calculated as (thinking sub-dimension + taking action sub-dimension + continuation sub-dimension – pre-thinking sub-dimension). According to the scores obtained, it is determined which stage of change

the patient is in [19]. The researcher met with a dietitian and consultancy was received, and a program was prepared accordingly. This program; It includes general information, importance, benefits and various suggestions about health problems/risks that may arise as a result of sedentary life and unbalanced nutrition, regular exercise and adequate-balanced nutrition. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Data were collected between August- October 2022 and 2023.

Before randomization, the sample was matched by BMI and age, using the median as reference to obtain a homogeneous distribution in both groups. Randomization of participants was then performed by assigning them to the control group (CG) or intervention group (IG) with the random function of Microsoft Office Excel (Microsoft Corporation, Redmond, WA, USA). All participants read and signed the relevant, specific, informed consent form before becoming a part of this research.

2.2. Participants

This study consisted of a total of 36 obese female participants, 18 in the control group and 18 in the intervention group, who were aged 65 and over and tried to control their weight by doing regular physical activity. Participants were selected among those with obesity level (BMI (kg/m²) ≥30.00) according to body mass index. Before the intervention and eight weeks the intervention, the behavioral attitudes of the participants were determined by the Exercise Change Processes Scale (ECPS) and the Nutrition Change Processes Scale (NCPS).

2.3. Recruitment

Of 45 initially recruited adults, six (20%) did not meet the inclusion criteria. The remaining 36 subjects were randomly assigned into two groups, IG (n = 18) and CG (n = 18). There was one dropout in the IG so the final analysis was performed on 18 CG and 17 IG subjects, as is shown in the flow diagram (Figure 1). This study ended eight weeks after the supervised exercise and nutrition intervention to assess long-term adherence to the intervention.

2.4. Data Collection Tools

2.5. Exercise Change Processes Scale (ECPS)

This scale, developed by Marcus et al., consists of 28 items [20]. In the scale, individuals'

2.6. Nutrition Change Processes Scale (NCPS)

In order to determine how NCPS practices affect the eating habits of some people, Prochaska et al. It was developed by [21]. Nutrition Change Processes Scale consists of a total of 12 sub-dimensions.

agreement with each statement is determined using a 5-degree Likert scale. How often the individual performs the exercise under the conditions specified in each item of the scale is determined by a rating score ranging from 1 to 5.

2. 7. Statistical Analyses

All statistical analyzes were performed with SPSS version 20.0. A P value of less than 0.05 was considered significant. Differences between the pretest and posttest of the Control and Experimental groups were analyzed by T test.

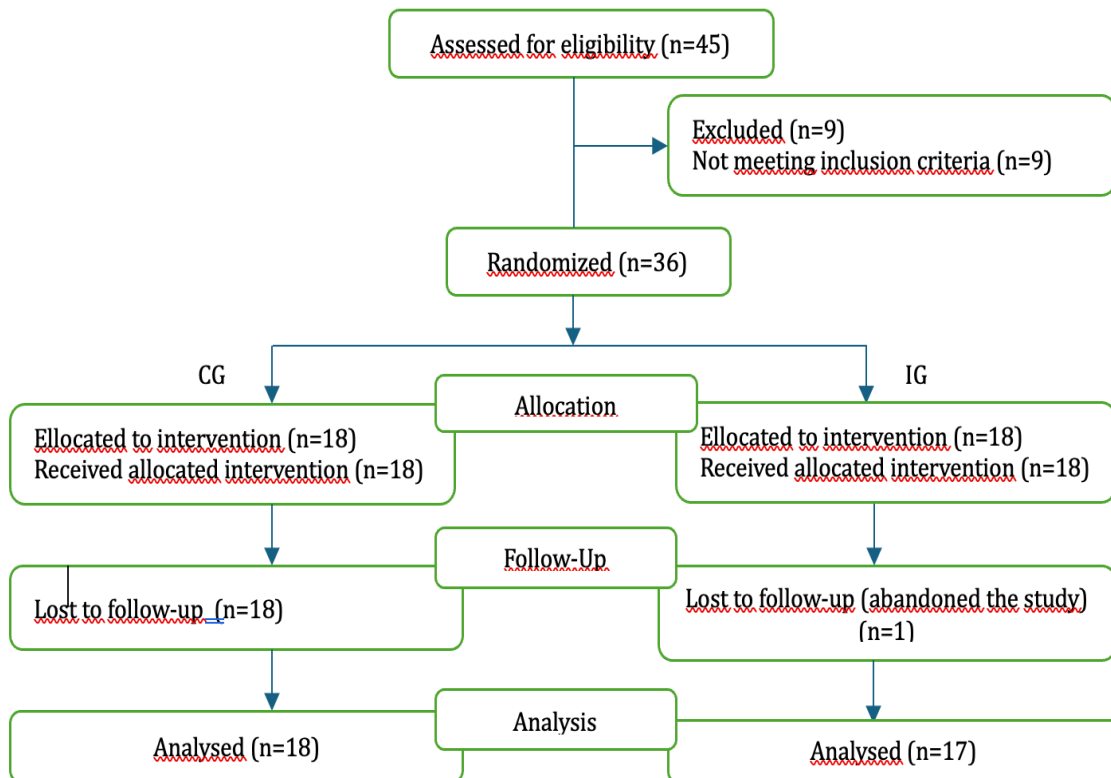


Figure 1. Flow diagram of exercise and nutrition lifestyle intervention in inactive older adults

3. RESULTS

Table 1. Comparison of pre-test and post-test measurements of physical characteristics of the control group

Characteristics	Testler	N	N	X	SD	p
Age (y)	Pre	18	69,20	3,25	,000	1,000
	Post	18	69,20	3,25		
Height (cm)	Pre	18	166,40	3,85	,000	1,000
	Post	18	166,40	3,85		
Body weight, mean (kg)	Pre	18	76,50	2,20	,231	,792
	Post	18	76,10	2,30		
BMI, kg/m2	Pre	18	31,90	0,27	,520	,532
	Post	18	31,60	0,34		

Mean (X), Std. Deviation (SD), Body mass index (BMI)

Baseline characteristics of the study participants by control groups are presented in Table 1. The majority of participants enrolled were

middle-aged women (mean age, 69,20±3,25 years). There were no significant control group differences in any of the baseline values.

Table 2. Comparison of pre-test and post-test measurements of physical characteristics of the intervention group

Characteristics	Testler	N	N	X	SD	p
Age (y)	Pre	17	68,70	3,10	,000	1,000
	Post	17	68,70	3,10		
Height (cm)	Pre	17	167,10	3,20	,000	1,000
	Post	17	167,10	3,20		
Body weight, mean (kg)	Pre	17	80,20	3,15	4,355	<00*
	Post	17	73,40	3,95		
BMI, kg/m2	Pre	17	31,05	0,40	10,122	<00*
	Post	17	24,08	0,92		

(P <0.00), Mean (X), Std. Deviation (SD), Body mass index (BMI),

Baseline characteristics of the study participants by intervention groups are presented in Table 2. The majority of participants enrolled were middle-aged women (mean age, 68,70±3,10

years); There were BMI and Body weight significant intervention group differences of the post-test values (p<00*).

Table 3. Comparison of pre-test and post-test measurements of the control group exercise change processes scale sub-dimensions

Sub-Dimensions	Testler	N	X	SD	t-değeri	Sig.
Consciousness Raising	Pre	18	5,96	0,85	-2,95	<023*
	Post	18	8,24	1,31		
Dramatic Relief	Pre	18	7,12	1,13	-,898	,327
	Post	18	7,67	1,52		
Environmental Reevaluation	Pre	18	5,24	0,77	-,351	,587
	Post	18	5,96	1,13		
Self Reevaluation	Pre	18	10,33	1,21	-,363	,692
	Post	18	10,88	0,83		
Social Liberation	Pre	18	7,88	1,16	-,778	,356
	Post	18	8,35	1,32		
Counterconditioning	Pre	18	7,65	0,60	-,733	,413
	Post	18	8,05	1,15		
Helping Relationships	Pre	18	5,78	0,35	-,259	,745
	Post	18	6,06	0,56		
Reinforcement Management	Pre	18	10,55	0,93	-,413	,621
	Post	18	10,95	0,72		
Self Liberation	Pre	18	10,03	0,81	,000	1,000
	Post	18	10,02	0,90		
Stimulus Control	Pre	18	8,91	0,61	-,410	,632
	Post	18	9,26	1,23		
Total Score	Pre	18	79,45	2,63	-25,872	,616
	Post	18	85,44	10,76		

Mean (X), Std. Deviation (SD), (P <0.05).

While there was a significant (p<023*) difference in Consciousness Raising according to

comparison of pre-test and post-test measurements of the control group exercise

change processes scale sub-dimensions, there were no significant between-group differences in other of the baseline values (Table 3).

Table 4. Comparison of pre-test and post-test measurements of the exercise change processes scale sub-dimensions in the intervention group

Sub-Dimensions	Testler	N	X	SD	t-değeri	Sig.
Consciousness Raising	Pre	17	6,40	1,11	-9,815	<000**
	Post	17	10,40	0,80		
Dramatic Relief	Pre	17	6,65	1,14	-6,562	<000**
	Post	17	9,95	1,02		
Environmental Reevaluation	Pre	17	5,10	0,42	-6,305	<000**
	Post	17	6,90	0,84		
Self Reevaluation	Pre	17	10,35	1,07	-2,827	<002**
	Post	17	11,75	1,26		
Social Liberation	Pre	17	8,28	0,95	-4,932	<000**
	Post	17	10,28	1,18		
Counterconditioning	Pre	17	8,10	0,90	-3,486	<005**
	Post	17	9,40	0,85		
Helping Relationships	Pre	17	6,38	0,72	-1,132	,278
	Post	17	6,72	0,61		
Reinforcement Management	Pre	17	10,60	0,62	-2,599	<011**
	Post	17	11,40	0,77		
Self Liberation	Pre	17	10,15	0,71	-3,885	<001**
	Post	17	11,30	0,85		
Stimulus Control	Pre	17	9,43	0,85	-5,572	<000**
	Post	17	11,27	0,78		
Total Score	Pre	17	81,44	2,15	-95,034	<000**
	Post	17	99,37	2,61		

Mean (X), Std. Deviation (SD), ($P < 0.000$), ($P < 0.05$).

While there was a no significant ($p > ,278$) difference in Helping Relationships according to comparison of pre-test and post-test measurements of the intervention group exercise

change processes scale sub-dimensions, there were significant between-group differences in other of the baseline values ($p < 0,05^*$; $< 001^*$)(Table 4).

Table 5. Comparison of pre-test and post-test measurements of the control group nutrition change processes scale sub-dimensions

Sub-Dimensions	Testler	N	X	SD	t-değeri	Sig.
Increased Level of Consciousness	Pre	18	11,88	1,22	,171	,859
	Post	18	11,96	1,00		
Dramatic Aid/Emotional Revitalization	Pre	18	13,22	1,66	,118	,877
	Post	18	13,14	1,17		
Reassessing the Environment	Pre	18	11,37	1,62	,302	,724
	Post	18	11,14	1,36		
Self-Reevaluation	Pre	18	16,95	1,11	3,512	<003**
	Post	18	14,90	1,62		
Social Freedom/Freedom	Pre	18	17,14	1,20	,000	1,000

	Post	18	17,14	1,10		
Opposite/Opposite Situation	Pre	18	9,90	1,19		
	Post	18	10,13	1,38	-,414	,667
Helpful Relationships	Pre	18	9,72	1,54		
	Post	18	10,82	1,65	-2,232	<026*
Reinforcement Management	Pre	18	14,34	1,23		
	Post	18	14,34	1,28	,000	1,000
Self-Liberation	Pre	18	12,29	1,28		
	Post	18	13,05	1,43	-,741	,424
Stimulus Control	Pre	18	9,72	1,09		
	Post	18	10,13	1,44	-,528	,569
Interpersonal System Control	Pre	18	10,13	1,10		
	Post	18	10,60	1,42	-,861	,378
Drug Use	Pre	18	13,66	1,05		
	Post	18	14,00	1,10	-,514	,615
Total Score	Pre	18	150,32	8,05		
	Post	18	152,35	8,25	-,371	,692

Mean (X), Std. Deviation (SD), ($P < 0.000$), ($P < 0.05$)

According to Comparison of pre-test and post-test measurements of the control group nutrition change processes scale sub-dimensions, there is a difference in Helping Self-Reevaluation

and Helpful Relationships ($p < 0.003^{**}$ and $p < 0.026^{*}$), while there are no significant differences in all other sub-dimensions (Table 5).

Table 6. Comparison of pre-test and post-test measurements of the nutrition change processes scale sub-dimensions in the intervention group

Sub-Dimensions	Testler	N	X	SD	t-değeri	Sig.
Increased Level of Consciousness	Pre	17	11,90	1,45		
	Post	17	13,98	1,18	-3,682	<001**
Dramatic Aid/Emotional Revitalization	Pre	17	13,37	1,41		
	Post	17	13,37	1,02	,000	1,000
Reassessing the Environment	Pre	17	11,28	1,63		
	Post	17	13,05	1,20	-2,397	<017*
Self-Reevaluation	Pre	17	17,01	1,14		
	Post	17	17,23	0,88	-2,527	<027*
Social Freedom/Freedom	Pre	17	17,10	0,84		
	Post	17	18,12	0,75	-3,323	<004**
Opposite/Opposite Situation	Pre	17	10,00	1,48		
	Post	17	13,10	1,20	-5,841	<000**
Helpful Relationships	Pre	17	9,13	0,79		
	Post	17	14,13	1,20	-10,978	<000**
Reinforcement Management	Pre	17	13,98	1,00		
	Post	17	17,08	1,43	-5,775	<000**

Self-Liberation	Pre	17	13,01	1,28	-5,319	<000**
	Post	17	15,95	1,28		
Stimulus Control	Pre	17	9,45	1,22	-8,115	<000**
	Post	17	13,08	0,49		
Interpersonal System Control	Pre	17	10,13	1,25	-4,374	<000**
	Post	17	13,10	1,81		
Drug Use	Pre	17	13,75	1,26	2,410	<022*
	Post	17	12,40	1,07		
Total Score	Pre	17	150,11	4,12	-4,235	<000**
	Post	17	161,49	3,27		

Mean (X), Std. Deviation (SD), (P <0.000), (P <0.05).

Comparison of pre-test and post-test measurements of the nutrition change processes scale sub-dimensions in the intervention group, there is a no difference in Dramatic Aid/Emotional Revitalization, while there are significant differences in all other sub-dimensions ($p < 0.05^*$; $< 0.001^*$), Table 6).

4. DISCUSSION

Very often seniors are overweight, unfortunately, their weight concerns are not sufficiently reflected by a higher level of health-seeking behaviours [22]. The aim of this study; investigated the effects of an eight-week exercise and nutrition lifestyle intervention on weight control and behavior change processes in sedentary older adults with overweight obesity. Obesity is an acute medic problem in elderly as we pointed out in the introduction. Moreover, obesity threatens the psychophysical health of the elderly. Besides it affects body-esteem and therefore self-esteem of obese people [23]. That is why many people especially women decide to lose weight. However observations of the slimming patients show that they are struggling with various psychosocial problems while body reduction. For instance obese individuals who wish to modify their dietary habits to permanently reduce their bodyweight are especially afraid of the risks associated with contact with fattening food. Not infrequently, individuals with excess body weight who undertake inefficient attempts to lose weight claim that their own internal predisposition, which is almost impossible to change, is the main reason behind their failure [24].

Obesity and physical inactivity, defined as today's most insidious diseases, emerge as an important public health problem [25]. The exercise behavior change process consists of cognitive and behavioral stages. The individual progresses in the behavioral change process by evaluating himself

and the environment. An individual's progress in the behavioral change process is not always in the right direction. Regressions and extinction of behavior are common during the behavior change process [26]. In this study on the Effect of Exercise and Nutrition Behavior Change Processes on the Prevention of Obesity in the Elderly, according to the comparison of pretest and posttest measurements of the physical characteristics of the Intervention and Control Group; When Body Weight (kg) and BMI score were examined, it was determined that there was a significant difference between the pre-test and post-test total mean scores in favor of the intervention group.

When we look at the ECPS sub-dimensions of the control group, it is seen that there is a significant increase in the "Level of Consciousness", but there is no significant difference in the other sub-dimensions. While there was no difference in the ECPS sub-dimensions of the intervention group, only in the "Helping Relationships" dimension; It was determined that there were significant differences in other sub-dimensions and the total score. When we look at the CAS sub-dimensions of the control group, it is seen that there is a significant increase in the "Self-Reevaluation, Helping Relationships" sub-dimensions and Total Score values, but there is no significant difference in the other sub-dimensions. While there was no difference in the EDSS sub-dimensions of the intervention group, only in the "Dramatic Help/Emotional Stimulation" dimension; It was determined that there were significant differences in other sub-dimensions and the total score.

Annunziato et al. [27], found in a study that there was a statistically significant difference between the average scores of the exercise change processes scale and the nutrition change processes scale in individuals before and after the intervention ($p < 0.01$). Bock et al. [28], determined in a study that there was a statistically significant

difference between the NCPS pre-intervention and all other follow-ups. Dilillo et al. [29], a statistically significant difference was found between the average scores of the exercise change processes scale before and after the intervention in the intervention group. Johnson et al. [30], found that the difference between the exercise change

processes subscale score averages was statistically significant. Rodgers et al. [31], found that the difference between the pre-test and post-test mean scores of the nutritional change processes scale of individuals in the intervention group was statistically significant.

5. CONCLUSIONS

In conclusion; It is important to acquire healthy lifestyle behaviors such as changing eating behavior, nutrition and activity habits regarding obesity among inactive elderly individuals. In this context, the targets in obesity are; -Providing weight loss, -Maintaining the achieved weight, -Preventing relapses by using regulatory mechanisms against obesity. Within the scope of ECPS and NCPS among inactive elderly individuals, it is aimed to prevent obesity in the elderly, improve health, and make people competent in improving and controlling their own health. Therefore, it is an inevitable fact that individuals develop healthy living awareness, improve their lifestyles, in a sense, prevent obesity and perceive increasing physical activity as a duty, and as a result, avoid risky behaviors and implement health-protective and promoting behaviors.

Author Contributions

Study Design, CL, PTD; Data Collection, CL, PTD; Statistical Analysis, CL, PTD; Data Interpretation, CL, PTD; Manuscript Preparation, CL, PTD; Literature Search, CL, PTD. All authors have read and agreed to the published version of the manuscript.

Conflict of Interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

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