Comparison of the Effect of Consuming 15 and 50 Grams of Pistachios on the Health Indicators of the Elderly Women

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Abstract

Introduction: A healthy diet and getting enough calories are important factors in health. Pistachios are rich in nutrients with healthy fatty acids, as well as protein, dietary fiber, potassium, magnesium, vitamins and have high antioxidant and anti-inflammatory properties. The aim of this study was to compare the consumption of two pistachios with 15 and 50 g on the health indicators of Aged women. With an interval of eight weeks, one group was given 50 grams of pistachios and one group was given 15 grams.

Materials and Methods: This quasi-experimental study was performed on 40 Aged women in bam city. Participants were randomly divided into two groups of 20 people. Height, weight, blood pressure, blood sugar, blood lipid profiles and red blood cell indices were measured before and after the intervention. Data were analyzed using SPSS software version 18.

Results: Before the intervention, there was no significant difference between the two groups in any of the measured indices. After the intervention, there was no significant difference between the two groups except in the values of fasting blood sugar. So that with the independent t-test, fasting blood sugar in the group with consumption of 50 grams was 101.57± 22.07 and in the group of 15 grams was 89.11± 8.16 (P=0.03).

Conclusion: Due to the positive effects on women's health indicators, which were observed in both doses of 15 and 50 g, according to the conditions and costs, it is recommended to add 15 g of pistachios to the diet of the elderly daily.

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1. Introduction

Paying attention to the increasing trend of aging in the country and the growing need of this aging group is a phenomenon that all countries that experience a significant decrease in fertility and increase in life expectancy face in the course of their demographic changes [1]. Worldwide, people over the age of 65 are estimated to increase from 461 million in 2004 to 2 million in 2050 [2]. Physiological changes, social and environmental effects, and decreased physical function are among the factors that increase the prevalence of malnutrition in the elderly [3]. Optimal nutritional status is a turning point for healthy aging [3]. Dietary interventions can be an effective way to help delay or prevent chronic diseases in the elderly [4, 5]. Following a healthy diet and getting enough calories is one of the effective factors in health status, especially in women [2].

One of the healthy diets is eating nuts [6, 7]. Consumption of nuts is associated with a reduced risk of coronary heart disease, diabetes, and obesity. This protective effect may be partly explained by the favorable effect of nuts on serum fats [8-11]. Nuts are low in carbohydrates, healthy fatty acid profiles, and rich in plant proteins, fiber, and magnesium. Nutrition studies show that eating nuts alone before meals have a lower effect on increasing blood sugar than after meals. Also, when nuts are consumed with carbohydrate-rich foods, they destroy the glycemic response after eating carbohydrates [6, 12]. Evidence shows that the macronutrient and bioactive compounds of nuts have positive effects on a healthy heart. Bioactive compounds, in addition to lowering oxidative stress and inflammation, may reduce the risk of cardiovascular disease by improving endothelial function, blood pressure, and serum lipid profiles. Nut folate levels may also help lower serum homocysteine levels. Decreased serum homocysteine concentrations can potentially reduce the risk of heart disease [6].

In France, the National Nutrition and Health Program (PNNS) published a set of dietary guidelines in January 2019 that recommended the daily consumption of a handful of saturated fat nuts such as walnuts, hazelnuts, almonds, and pistachios [13]. A Harvard study found that women who ate nuts more than twice a week were underweight and less obese than their peers who ate nuts infrequently [14]. Pistachios, like other nuts, are high in protein, fiber, and unsaturated fats, which may facilitate satiety and compensate for the lack of other nutrients in the diet. In a study by Fantino et al., A daily intake of 44 grams of pistachios increased nutrient intake without affecting body weight or body composition in healthy women. [13]. Compared to other nuts, pistachios are a rich source of antioxidants, including lutein, beta-carotene, and tocopherol in addition to selenium, flavonoids, and proanthocyanins [15]. Long-term consumption of pistachios may improve glucose homeostasis [8].

Consumption of 2 to 3 ounces per day of pistachio nuts can significantly improve HDL-C cholesterol [16]. The inclusion of pistachios in a healthy diet affects lipids and lipoproteins in a dose-dependent manner [15].

The results of a study by Del Gobbo et al. (2015) showed Doses higher than 60 grams of nuts per day (about 2 ounces or 2 servings per day) have more severe effects on cholesterol; It has also been shown that consuming 100 grams of nuts can lower cholesterol to 35 mg / L [17]. The results of the study by Kocyigit et al. (2006) showed that consumption of 2.5 ounces per day of pistachios for 3 weeks in 44 healthy individuals did not cause significant changes in BMI.[18].

Although many studies have been done on the effect of nuts, especially pistachios, on fat and blood sugar profiles, there are few studies on the amount of consumption and the effect of different doses of pistachios, especially in the elderly. Therefore, this study aimed to compare the consumption of two pistachios amounts with 15 and 50 grams on the indicators affecting the health of elderly women living in Bam aged care center.

2. Materials and Methods

This is a quasi-experimental study with ethics code IR.RUMS.REC.1394.109. The research population was fifty-six elderly people living in a nursing home in Bam. Among these elderly people, 40 had the inclusion criteria that were randomly divided into two groups of intervention and control. Inclusion criteria: Literacy, interest in diet, no weight loss or special diet in the last six months, no incurable diseases and no use of certain drugs except blood pressure and diabetes, interest in daily consumption of pistachios and participation in the study, lack of allergy to pistachios and no kidney and liver diseases were considered. Exclusion criteria included not following the diet of the subject of this study and quitting pistachio consumption and fatigue from continuing the study.

The sample size was determined using the formula of 20 people for each group. Necessary coordination was done with the Bam aged care center and 40 elderly women from the Bam aged care center were selected as a sample.

Blood glucose, height, weight, body mass index, blood pressure, blood lipid profiles, and erythrocyte parameters (hemoglobin, hematocrit, erythrocyte count, MCV, and MCH) were checked before the study. The elderlies were randomly divided into two groups of twenty. With an interval of eight weeks, a group was given 50 grams of pistachio nuts and one group was given 15 grams of pistachio nuts. For 15 grams of pistachios, five percent of the daily caloric intake and for 50 grams of pistachios, 20 percent of the daily caloric intake is reduced. The nutrition of the elderly was the same in both groups. After eight weeks of the diet with recorded calories and activity, blood sugar, height, weight, body mass index, blood pressure, blood lipid profiles, and erythrocyte parameters of the elderly were checked.

Trained nurses monitor the blood pressure of the elderly. Blood pressure was measured with a standard Boso hand-held sphygmomanometer. Blood pressure was measured in the examination room at a suitable temperature. The distance of the examinee from the blood pressure receiver was not more than one meter. Blood pressure was measured from the right hand while sitting. The patient had not consumed caffeine for at least 30 minutes before measuring blood pressure. She rested for five minutes before her blood pressure and did not speak while controlling her blood pressure. The person's feet were on the ground. The arm of the hand was placed so that it had a support and was level with the heart horizontally.

The weight of all people in the fasting state was measured using a Seca digital scale model 813 made in Germany with an accuracy of one-tenth of a kilogram, in the shoeless state and with the minimum clothing (identical sportswear provided for both groups). Measure height took place in centimeters using an inelastic tape measure with an accuracy of one-tenth of a centimeter and between the hours of 8:00 to 00:00 (simultaneously with the weight measurement) without shoes while standing with back to a flat wall and heels, buttocks, shoulders, and back were in contact with the wall. Also, the subjects' body mass index was obtained by dividing weight in kilograms by height squared in meters.

10 cc of blood samples were taken from each elderly before and after the intervention. Fasting blood samples were taken to measure serum glucose and fat after 10 to 12 hours of fasting. Cholesterol (TC) and triglyceride (TG) were measured by enzymatic calorimetry with cholesterol oxidase, respectively, using Pars Azmon kits. HDL-C was measured after precipitation of apolipoprotein solution with phosphotungstic acid. Erythrocyte parameters were measured by the CBC diff method.

Finally, the obtained data were analyzed using statistical tests of independent t-test, chi-square at the error level of 0.05 using SPSS software version 18.

Findings

The mean age of the participants in the two groups was over 79 years and their body mass index was between 22 and 23. The Independent t-test did not show a significant difference between the two groups (P= 0.706). Independent t-test showed that the BMI of the participants in the two groups before and after the intervention was not significantly different (P> 0.05). The mean systolic and diastolic blood pressure of the two groups before and after the intervention did not show a significant difference (P> 0.05). The mean fasting blood sugar of the two groups before the intervention did not show a significant difference (P> 0.05). But after fasting blood sugar intervention, the group of 50 g pistachios consumption was higher than the group of 15 g group and the independent t-test showed a significant difference between the two groups (P= 0.03). Regarding the mean of triglyceride, cholesterol, and HDL, no

significant difference was observed between the two groups before and after the intervention (P> 0.05).

Data related to the comparing pre- and post-values of participants who consumed 50 grams of pistachios per day showed paired t-test that mean blood sugar increased after consumption, mean triglyceride decreased, and HDL levels increased. Although the mean cholesterol increased after consumption, this increase did not show a statistically significant difference (P= 0.154). The mean systolic and diastolic blood pressure values were not statistically different than before (P> 0.05). In the group with 15 grams of pistachios, paired t-test also showed the values of systolic and diastolic blood pressure did not change compared to before. But the mean fasting blood sugar (P< 0.0001), cholesterol, and HDL increased after consumption and there was no statistically significant difference between before and after consumption. The mean triglyceride, although decreased after consumption, did not show a statistically significant difference (P= 0.462). (Table 1)

Table1: Comparison of indicators affecting the health of elderly women in the consumption of 50 and 15 grams of pistachios before and after the intervention.

A comparison of the average parameters related to the effect of pistachio consumption of 50 and 15 grams with independent t-test shows that there was no significant difference between these two consumptions on the average number of red cells, hemoglobin, and hematocrit (P> 0.05). However, in the 50g consumption group Paired t-test showed, before and after consumption, the mean hemoglobin increased and a significant difference was observed (P= 0.01). But in the consumption group of 15 g, the average hematocrit and the number of red cells after consumption increased, and a significant difference was observed between before and after (P<0.05). Examination of red cell indices also showed no significant difference between the two groups before and after the intervention (P>0.05). But comparing the mean before and after MCH and MCHC indices showed that the mean values Pafter the intervention increased compared to before and there was a significant difference between before and after (P< 0.05). But there was no significant difference between the mean before and after the MCV index in both groups (P> 0.05) (Table 2).

Table1- Comparison of indicators affecting the health of elderly women in the consumption of 50 and 15 grams of pistachios before and after the intervention

Variable		50 gr	15 gr	T-TEST GROUPs		
				t	df	P-Value
Age		79.65±8.33	80.82±12.26	-0.38	44	0.706
BMI	**before**	22.00±4.12	23.06±4.31	-0.85	44	0.397
	after	21.94±4.07	22.86±4.21	-0.75	44	0.455
Paired t test		T=.395, Df=22 P=.696	T=2.168 Df=22 P=.041			
Systolic blood pressure	**before**	133.91±21.05	125.65±10.79	1.675	44	0.101
	after	128.26±18.5	123.47±14.65	0.972	44	0.336
Paired t test		T=1.924 Df=22 P=.067	T=.722 Df=22 P=.478			
Diastolic blood pressure	**before**	76.52±11.91	78.69±13.58	-0.577	44	0.567
	after	76.08±12.33	76.52±10.27	-0.13	44	0.897
Paired t test		T=.170 Df=22 P=.866	T=1.045 Df=22 P=.308			
Fasting blood sugar	**before**	92.00±21.21	85.08±7.51	1.473	44	0.148
	after	101.57±22.07	89.11±8.16	2.254	35	0.03
Paired t test		T=-3.017 Df=18 P=.007	T=-4.444 Df=17 P=.0001			
Triglyceride	**before**	140.00±48.56	117.31±35.36	1.725	39	0.092
	after	127.76±46.95	115.05±47.48	0.785	32	0.438
Paired t test		T=2.242 Df=13 P=.043	T=.755 Df=15 P=.462			
Cholesterol	**before**	189.58±38.37	178.00±31.00	1.068	39	0.292
	after	214.41±33.25	206.82±30.37	0.695	32	0.492
Paired t test		T=-1.512 Df=13 P=.154	T=-3.075 Df=16 P=.007			
HDL	**before**	44.47±10.37	46.36±10.14	-0.589	39	0.559
	after	48.23±8.03	49.00±8.10	-0.276	32	0.784
Paired t test		T=-2.466 Df=13 P=.028	T=-2.808 Df=15 P=.013			

Table 2- Comparison of red blood cell indices in elderly women in the consumption of 50 and 15 grams of pistachios before and after the intervention

Variable		50 gr	15 gr	T-TEST GROUPs		
				t	df	p-Value
RBC	**before**	4.76±0.28	4.49±0.82	0.316	32	0.197
	after	4.88±0.75	4.77±0.83	0.487	43	0.629
Paired t test		T=.126 Df=15 P=.901	T=-2.203 Df=16 P=.043			
Hemoglobin	**before**	12.57±2.71	12.48±2.34	0.126	43	0.90
	after	12.61±2.55	12.31±2.48	0.374	32	0.731
Paired t test		T=-2.926 Df=15 P=.010	T=-.031 Df=16 P=.975			
Hematocrit	**before**	40.63±5.61	39.26±5.91	0.693	32	0.493
	after	41.36±6.45	41.09±5.86	0.143	43	0.887
Paired t test		T=1.442 Df=15 P=.170	T=-2.527 Df=16 P=.022			
MCV	**before**	84.79±7.91	87.07±12.25	-0.739	43	0.464
	after	85.09±9.60	88.84±12.63	-0.975	32	0.337
Paired t test		T=-1.884 Df=15 P=.079	T=-1.279 Df=16 P=.219			
MCH	**before**	25.67±3.64	26.37±4.82	-0.552	43	0.584
	after	26.37±4.81	27.84±5.06	-0.867	32	0.392
Paired t test		T=-3.950 Df=15 P=.001	T=-5.049 Df=16 P=.0001			
MCHC	**before**	30.15±2.25	30.17±2.10	-0.037	43	0.971
	after	30.74±2.89	31.15±2.20	-0.460	32	0.649
Paired t test		T=-4.481 Df=15 P=.0001	T=-6.465 Df=16 P=.0001			
RDW_SD	**before**	44.36±3.88	46.97±6.24	-1.578	39	0.123
	after	45.57±3.82	46.84±5.98	-0.737	32	0.466
Paired t test		T=-3.220 Df=13 P=.007	T=.756 Df=15 P=.461			
RDW_CV	**before**	13.53±1.82	14.01±1.82	-0.834	39	0.409
	after	14.15±2.69	13.97±2.02	0.216	32	0.830
Paired t test		T=-2.214 Df=13 P=.045	T=.379 Df=15 P=.710			
RDW	**before**	14.07±1.91	13.39±2.71	0.917	39	0.365
	after	13.11±1.37	12.35±1.97	1.286	31	0.208
Paired t test		T=1.151 Df=12 P=.272	T=5.102 Df=15 P=.0001			

Discussion

Findings showed that before the intervention, there was no significant difference between the two groups in any of the measured parameters. After the intervention, no significant difference was observed between the two groups except for the values of fasting blood sugar. Consumption of 50 grams has increased fasting blood sugar to a higher level.

A comparison of the two consumption levels showed the effect of pistachio on many of the studied variables after the intervention compared to before. Consumption of 50 grams of pistachios did not affect participants' body mass index, while consumption of 15 grams reduced body mass index after the intervention. Studies have shown that pistachio consumption with different amounts and duration of consumption does not affect the weight and body mass index of the subjects [18, 19]. However, in this study, it was found that consumption of 15 grams of pistachios per day has reduced the body mass index of the elderly under study. The impure energy of pistachio nuts was measured at 46.29 kg / g. Therefore, the higher the consumption of pistachios, the higher the number of calories received. Maybe that's why consuming 50 grams of pistachios compared to 15 grams did not affect weight loss.

Pistachio consumption in both groups did not affect systolic and diastolic blood pressure and there was no significant difference between before and after the two groups. In a study by Sauder et al. (2014) on 30 people with a mean age of 56 years, it was shown that 59 to 128 grams of pistachios reduced systolic blood pressure by 3.2 ± 5.2 mm Hg and acknowledged that this reduction in systolic blood pressure can reduce coronary artery disease and stroke mortality by 5 to 8% [20]. In the present study, consumption of 50 grams of pistachios reduced systolic blood pressure compared to before, but this reduction was not statistically significant. However, the reduction in systolic blood pressure was lower in the consumption of 15 grams per day. Based on the findings of this study and similar studies, it seems that the higher the consumption of pistachios, the greater its effect on systolic blood pressure.

In the present study, the consumption of 50 g of pistachio increased fasting blood sugar compared to the consumption of 15 g, and a significant difference was observed between the two groups. But the average increase in fasting blood glucose in both groups was in the normal range. Findings from similar studies in this regard are contradictory. For example, in a study by Sauder et al. on 30 types 2 diabetic patients aged 40-74 years, it was found that consumption of 59-128 grams of pistachios for 4 weeks did not affect fasting blood sugar HbA1c [21]. However, in the study of Parham et al., It was reported that consumption of pistachios at 25 grams per day for 12 weeks reduced fasting glucose and HbA1c compared to the control group

[22]. It seems that based on the study sample, whether patients have diabetes or not, as well as the amount of pistachio consumption per day or the duration of pistachio administration, the studies can be different. However, it can be acknowledged that consuming higher doses of pistachios is likely to increase fasting blood sugar to a greater extent.

Triglyceride decreased in the 50 g group of pistachios before and after the intervention and a significant difference was observed between before and after the intervention. Also, triglyceride decreased in the 15 g group of pistachios but there was no statistically significant difference. Increased cholesterol was more evident in the consumption group of 15 grams of pistachios than the consumption of 50 grams and the difference before and after was significant. Despite the increase in cholesterol, pistachio consumption increased HDL levels in both groups and this increase was statistically significant. Numerous studies have been performed on the effects of pistachios on serum cholesterol and HDL levels. In a 2008 study by Gebauer on 23 people, different amounts of pistachios from 32-63 grams (1.5 ounces) and 63-126 grams (3 ounces) per day were prescribed, depending on the calorie level for each person. Participants ate approximately 1-2 servings of nuts a day. The findings of this study showed that triglyceride and cholesterol to HDL ratio were significantly lower in the 3-ounce pistachio diet than in the control diet (pistachio-free diet). Besides, there was a significant difference between 1.5 ounce and 3-ounce pistachio diets for TC / HDL-C ratio, indicating a dose-dependent effect [23]. In the study of Sheridan et al., It was shown that consuming 2.5 ounces of pistachios per day for 4 weeks caused a significant increase in HDL-C. However, no significant changes were seen in triglycerides. The study by Edwards et al., Which was performed on ten men and women with an average age of 46 years and average cholesterol of 243 mg / L, showed that after three weeks, the pistachio nuts diet group had a significant reduction in total cholesterol, cholesterol, cholesterol / HDL and increased HDL cholesterol [19]. In terms of comparing these two methods of consumption on red blood cells and related indexes, the findings of the study showed that there was no significant difference between the two methods of consumption with doses of 50 and 15 grams. But the comparison before and after each group shows that pistachios had a positive effect. Consumption of 50 and 15 g of pistachios increased MCH and MCHC values in both groups but did not affect the MCV index. Consumption of 50 grams of pistachios did not affect the number of red cells, while consumption of 15 grams increased the number of red cells, consumption of 50 grams of pistachios increased the amount of hemoglobin but did not affect the percentage of hematocrit, while consumption of 15 grams of pistachios did not affect hemoglobin, increased the percentage of hematocrit. Perhaps due to the increase in the number of red cells in this group, the percentage of hematocrit has increased.

If the participants were more eligible in this study, it was possible to study the sample size higher. It is recommended that this study be performed in the elderly with underlying problems such as diabetes and hypertension.

Conclusion

The findings of this study showed that there was no significant difference between the two doses in many indicators related to the health of older women. However, the effect of 15- and 50-grams consumption was observed on many positive health indicators. Therefore, based on the findings of this study, it is recommended to add pistachio nuts to the diet of the elderly. However, due to the higher cost of higher amounts of pistachio consumption, the minimum daily consumption of 15 grams can be used.

Conflict of Interest

The authors declare that there is no conflict of interests regarding the publication of this article.

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