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RESEARCH

EXERCISE PRESCRIPTION BY PRIMARY CARE DOCTORS: EFFECT ON PHYSICAL ACTIVITY LEVEL AND FUNCTIONAL ABILITIES IN ELDERLY

ABSTRACT

Introduction: In this study, physical activity counseling and exercise prescriptions have given to sedentary elderly by primary care doctors. And then it has aimed to examine the effects of this counseling and prescriptions on physical activity level and functional abilities.

Materials and Method: Sedentary patients aged 50-70, without any physical health condition participated voluntarily to this study. The control group comprised of 69 inviduals and the intervention group of 51 individuals. The intervention group were advised to exercise and were trained 30 minutes on physical activity. Exercise presription, a set of education was also handed out. prescriptions were renewed every month. The individuals in control group were informed by their doctors for 5-10 minutes on how to increase the physical activity and about the benefits of physical activity. With the aim of measuring the effectiveness of exercise prescriptions daily energy expenditure, antropometric measure, functional measures and repeated at the 3rd and 6th month of study.

Results:A significant improvement between first and last measures of daily energy expenditure, systolic and diastolic blood pressure, waist and hip circumference, BMI, resting pulse, down extremity strenght, upper extremity strenght, down extremity flexibility, upper extremity flexibility, balance characteristic ($p<0.05$) in the intervention group was observed. Between groups a significant difference was observed in the systolic blood pressure, waist circumference, resting pulse, lower extremity strength, upper extremity strength, lower extremity flexibility, and balance ($p<0.05$).

Conclusion: Physical activity counseling and exercise prescription have given primary care doctors showed positive improvements on physical activity level and functional abilities in sedentary elderly

Key Words: Aging; Exercise; Physical Activity.

ARAŞTIRMA

BİRİNCİ BASAMAK HEKİMLERİ TARAFINDAN EGZERSİZ REÇETESİ: YAŞLILARDA FİZİKSEL AKTİVİTE DÜZEYİ VE FONKSİYONEL ÖZELLİKLER ÜZERİNE ETKİSİ

ÖZ

Giriş: Bu çalışmada birinci basamak hekimleri tarafından sedanter yaşlılara egzersiz reçetesi ve bedensel etkinlik önerileri verilmiştir. Daha sonra bu tavsiye ve reçetelerin bedensel etkinlik düzeyi ve fonksiyonel özellikler üzerine etkilerinin incelenmesi amaçlanmıştır.

Gereç ve Yöntem: Çalışmaya 50-70 yaş arasında sedanter, bedensel etkinliğe katılım için herhangi bir sağlık engeli olmayan kişiler katılmıştır. Çalışmada girişim grubunda n=51, kontrol grubunda n=69 birey yer almıştır. Girişim grubunda yer alan kişilere bedensel etkinlik üzerine 30 dakikalık kursun yanında eğitim seti ve egzersiz reçetesi verilmiştir. Egzersiz reçeteleri her ay güncellenmiştir. Kontrol grubundaki kişilere ise 5-10 dakikalık bedensel etkinliğin faydaları ve bedensel etkinliği nasıl arttıracakları konusunda tavsiyelerde bulunulmuştur. Egzersiz reçetelerinin etkinliğini ölçmek amacıyla günlük enerji tüketimi, antropometrik ölçümler, fonksiyonel ölçümler çalışmaya başlamadan önce, 3. ayda ve 6. ayda tekrar edilmiştir

Bulgular: Günlük enerji tüketimi, sistolik kan basıncı, diyastolik kan basıncı, bel ve kalça çevresi, BKI, dinlenik kalp atım sayısı, alt ekstremite kuvveti, üst ekstremite kuvveti, alt ekstremite esnekliği, üst ekstremite esnekliği, denge özelliği bakımından zamanla girişim grubunda ilk ve son ölçümler arasında anlamlı iyileşme gözlenmiştir ($p<0.05$). Gruplar arasında SKB, kalça çevresi, dinlenim KAS, alt ekstremite kuvveti, üst ekstremite kuvveti, üst ekstremite esnekliği ve denge özelliği bakımından anlamlı fark gözlenmiştir ($p<0.05$).

Sonuç: Birinci basamak hekimleri tarafından verilen bedensel etkinlik önerilerinin ve egzersiz reçetelerinin sedanter yaşlıların fiziksel aktivite düzeyini ve fonksiyonel özelliklerini arttırdığı görülmüştür.

Anahtar Sözcükler: Yaşlılık; Egzersiz; Bedensel Etkinlik.

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Introduction

Physical activity can be defined as any body movements that are produced by skeletal muscles and result in energy consumption. Regular walking at a medium pace, riding a bike and other sports activities have a significant impact on people's health (1).

Physical activity improves the quality of life at any age in various ways (2). It also has an important effect on the health of people who are involved in regular physical activity. The reduction of the risk of heart disease, diabetes, osteoporosis and colon cancer are some of these outcomes. Moreover, physical activity helps people to become psychologically healthy by reducing the risk of loneliness and depression (1).

Physical activity also maintains and improves the endurance, strength, flexibility and balance that affect the functional properties of the individual. Regular physical activity keeps and improves balance, endurance, strength, and flexibility (3). Improved flexibility, balance and muscles may prevent falls (4). Since falls are a disabling syndrome in the elderly, physical activity interventions in this risk group might have an important impact on this problem (5).

Besides reducing falls in elderly people, physical activity could also provide economic benefits by prevent problems and improving functional capacity in this risk group (5).

Even though physical activity is vital for health, the levels of participation in physical activities are quite low. Globally, 17% of adults are estimated to be sedentary and 41% are not active enough to have health benefits from exercise (6).

The US Preventive Services Task Force (USPSTF) has suggested that doctors and health care workers recommend exercise regularly during their clinical encounters (7). Doctors and health professionals have an important influence on changing behaviors and reducing the risk factors of patients (8). Therefore, doctors and health professionals could play a significant role in promoting physical activity among their patients (9). But research shows that only a few doctors and health professionals recommend physical activity. Reasons for this are lack of time, ability and skills for prescribing physical activity, and materials and resources (10).

New scientific evidence is showing that interventions increase the level of physical activity (11). A study from Turkey showed that the level of physical activity is about 3% (12). This is far behind the level of other developed countries. Therefore an approach to increase physical activity in Turkey is very important. Doctors, who know about behavior change models and training science, are the appropriate professionals to increase the impact of prescribed exercise in their patients.

In this study, we evaluated the effect of prescribed exercise on the level of exercise and functional abilities of elderly patients. The exercise prescriptions were supported by educational material, and given by primary care doctors who were trained in behavior change models and physical activity.

Materials and Method

Design

This study covers a part of PhD thesis, and the study previously unpublished in any journal. Before the study was started, ethic committee permission was taken from Akdeniz University Medicine Faculty at date of 11.05.2006 and later study was started. The participants in this study were divided into two groups: intervention group (IG) and control group (CG). Measurements were applied at three different periods: Baseline (pre-intervention), and the third and sixth months of the post-intervention period. Baseline measurements consisted of two stages: The first stage examined the conditions of potential participants in this study. Inclusion criteria were evaluated at this stage. Participants not fulfilling the criteria were excluded from the study. The second stage consisted of evaluating physical activity and physical performance levels of participants fulfilling inclusion criteria. At this stage the 7-days-recall questionnaire was administered in order to determine participants' physical activity level. Physical performance measurements included the chair stand test, sit and reach test, back scratch test, balance test, and resistance band maximum repetition frequency test. In addition, heart rate, body weight, height, hip and waist circumference measurements were also applied. Stages of measurements are shown in Table 1.

Setting

Primary care health centers from the metropolitan area of Antalya, Turkey, were chosen as study and intervention sites. Thirty nine primary health care centers were addressed and 33 centers were eligible for this study. The remaining six centers were too far from the center of Antalya or were located in suburban or industrial districts (Figure 1).

Participating doctors in the study were divided into two groups, IG and CG, by random selection (Figure 1). Doctors from both groups attended the theoretical part (14 hours) of the exercise prescription course and the intervention group also attended the practical part of the course (10 hours). At

Table 1— Stages of Measurements

Measurements	Criteria for being in the study (1st stage)	Preliminary Considerations (2nd stage)	3- Month Consideration (2nd stage)	6- Month Consideration (2nd stage)
Examining the illnesses and being involved in the study	X			
Physical Activity Readiness Questionnaire (Par-Q)	X			
Physical Activity Levels Questionnaire	X			
SMMSE	X			
Transtheoretical Methods of Behavior Change (Tendency to Sport Test)	X			
Sociodemographic Questionnaire		X		
Energy Consumption (Seven day Recall Questionnaire) (kcal/kg/day)		X	X	X
Systolic Blood Pressure (mmHg)		X	X	X
Diastolic Blood Pressure (mmHg)		X	X	X
Waist Circumference (cm)		X	X	X
Hip Circumference (cm)		X	X	X
Height (cm)		X	X	X
Weight (kg)		X	X	X
BMI (kg/m2)		X	X	X
Resting Heart Rates (beats per minute)		X	X	X
Functional Capacity Tests				
Lower Extremity Muscle Strength (Chair Stand Test)		X	X	X
Upper Extremity Muscle Strength (resistance band maximum repetition frequency)		X	X	X
Lower Extremity Flexibility (Sit and reach test)		X	X	X
Upper Extremity Flexibility (Back Stretch Test)		X	X	X
Balance Test (One Leg Stand Duration)		X	X	X

the end of the 24 hours of training the doctors in the intervention group were given a "Doctor's Manual".

In addition, the IG received instructional material and an equipment kit, which was prepared for the IG patients. "First Step to Active Health" was translated into Turkish for this purpose and was included in the kit [(www.FirstStepToActiveHealth.com. Transl. by Atay E and edited by Prof. Yaman H.]. In addition to the booklet and kit, the Turkish version of Borg's Scale (Rating of Perceived Exertion Scale-RPE) was given to the participants of the study to enable them to measure the intensity of their activity. The kit also included a resistance rubber band for strength exercises.

Inclusion Criteria for Participants

Volunteer participants were evaluated at the primary health care centers. Inclusion criteria for participating at this study were (Figure 2):

1. Being between 50 and 70 years old.
2. Being sedentary. The state of being sedentary was evaluated by a two question test prepared by Marshall et al. Patients who scored three points or less were accepted to the study (13).
3. Being able to participate in physical activity. The Turkish version of the Physical Activity Readiness Questionary (PAR-Q) was used to screen for any unfavorable health condition that might interfere with participation in this study (14).
4. Potential participants were selected from patients/individuals who were at the contemplation and preparation phases of the Transtheoretical Model of Behavior Change (15).
5. Cognitive status was evaluated with the Turkish version of the Standardized Mini Mental Examination Test (SMMSE) (16). Participants scoring 24 points and over were accepted into the study.
6. Unstable chronic illness was an exclusion criterion.

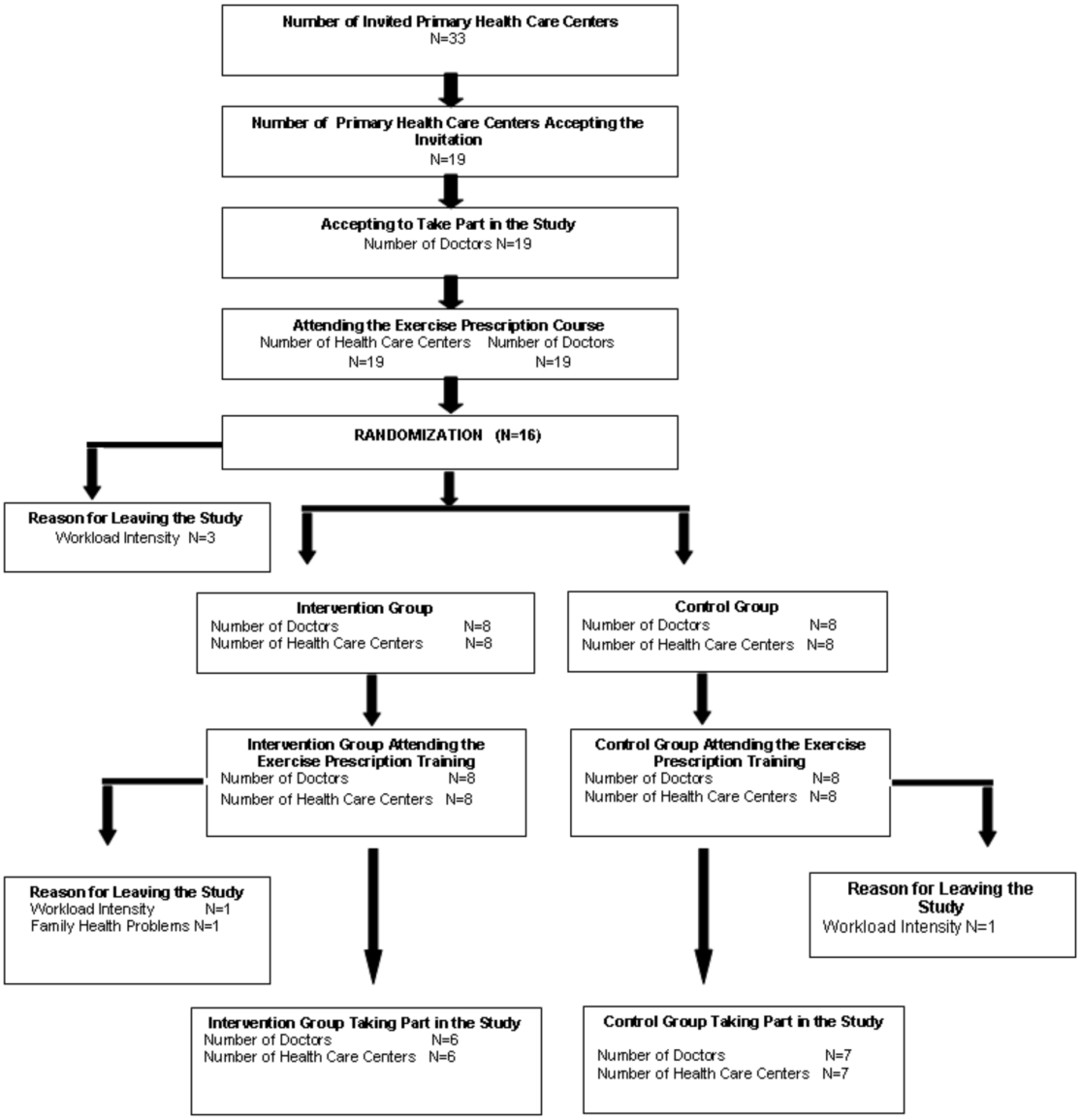

Figure 1— Flow chart of the study.

7. Participants were expected to continue to live in Antalya for at least six months.
8. Being able to walk for 15 minutes.
9. Living at 30 minutes walking distance from the primary health care center.

IG Participants

After being informed about the benefits of physical activity, each patient in the IG was give 30 minutes of training on how to do endurance, strength, balance and flexibility exercises; how to use the resistance band and Borg's Scale; how to control walking pace by the talk test; and how to improve physical activity level. Participants received instructional material and an equipment kit (resistance band, Borg's Scale, Program Booklet) at the end of the training. Prescriptions were updated every month.

CG Participants

Participants in the CG just received recommendations on the benefits of physical activity.

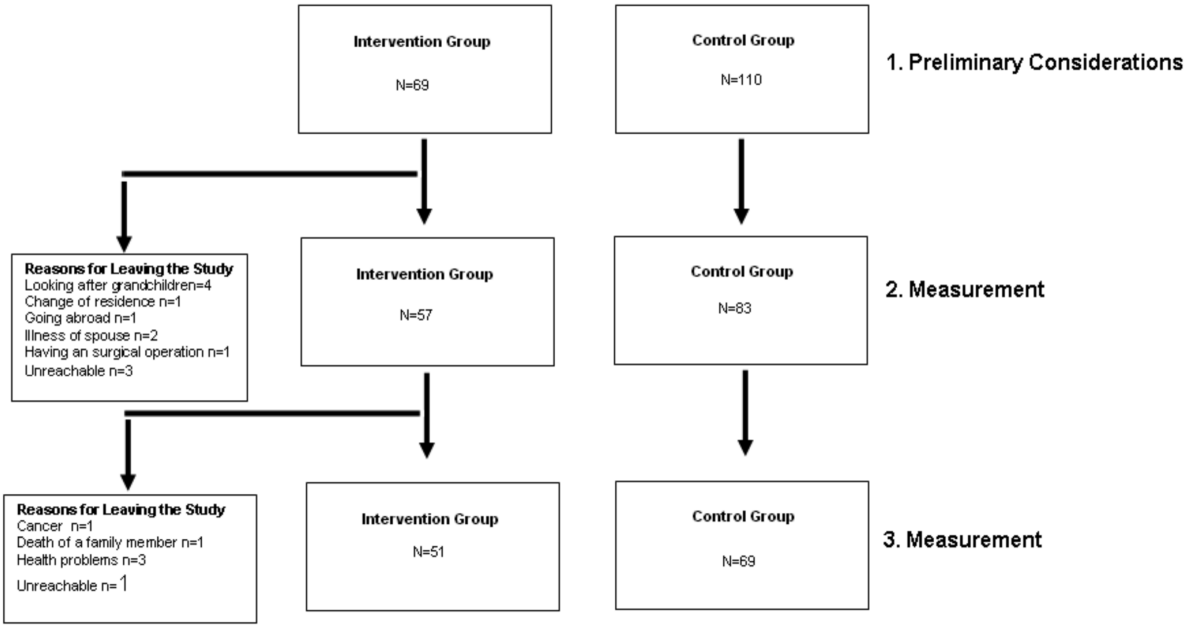

Figure 2— Recruitment of participants and follow-up.

Measurement Methods

Daily Energy Consumption

The Seven Day Recall Physical Activity Questionnaire was used for estimating daily energy consumption. This questionnaire is a diary, which registers sleep duration, physical activities and their duration and intensity, for the past week (17).

Physical Performance

Changes in the physical performance of participants were assessed with five different test protocols. Doctors participating in this study were trained in the administration of these tests. After being able to achieve reliable results, the doctors were considered to be competent to perform these measurements in their patients for this study.

a. The 30 Second Chair-Stand Test: This test assesses lower body strength. The frequency and the quality of performing this task correctly are scored.
b. The Resistance Band Maximum Repetition Frequency Test: This test assesses upper body strength. The maximum number of executed pulling movements was recorded.
c. The Chair Sit-and-Reach Test: This test assesses lower body flexibility. The distance between finger and toe is measured in cm.
d. The Back Stretch Test: This test assesses upper body flexibility. The distance between finger tips is measured in cm.
e. One Leg Stand Duration Test: This test assesses body balance. The duration of one foot balance is measured with a stop watch.
f. Measurement of Blood Pressure: Blood pressure was measured from upper extremity. The level of sensitivity is set at 0.1 mmHg.
g. Measurement of waist circumference: The participant breathes normally while a non-elastic measuring tape is applied at the level of the umbilicus and the waist circumference is measured on a horizontal plane while participant stands. The mean value of three consecutive measurements is used and the level of sensitivity is set at 0.1 cm.
h. Measurement of hip circumference: The level of measurement in the front is at the symphysis pubis level and in the back at the outer part of the gluteal muscles. The measurement tape is non-elastic; the mean value of three consecutive measurements is used and the level of sensitivity is set at 0.1 cm.

Statistical Analysis

Shapiro-Wilk test determined the normality of data distribution and Levene test determined the variance homogeneity of

Table 2— Characteristics of the Participants.

Characteristics	Intervention Group (%) (n=69)	Control Group (%) (n=110)	p value
Gender			
Male	43.5	35.8	0.304
Female	56.5	64.2	
Occupation			
Retired	55.1	20.2	0.000
Housewife	5.8	46.8	
Worker	26.1	19.3	
Civil Servant	7.2	10.1	
Self Employed	5.7	3.1	
Education			
Illiterate	1.4	13.8	0.000
Primary school	52.2	66.1	
High school	11.6	10.1	
University	34.8	10.1	
Marital Status			
Married	87.0	89	0.453
Single	1.4	8.3	
Widowed	7.2	1.8	
Divorced	4.3	-	
Smoking			
Yes	17.4	19.3	0.908
No	82.6	80.7	

the data. Student's t test and Mann-Whitney U tests compared baseline values between IG and CG. Multiple 3x2 (time x group) repeated-measures ANOVAs were performed to determine differences within and between groups over time. Analysis of covariance (ANCOVA) was performed on outcome variables at the end of the study. The covariate used was the baseline value for each participant for the particular outcome variable being analyzed. The criterion for statistical significance was set at an alpha level of 0.05.

Results

At baseline, the ages of participants were 58.77±5.15 years (n=69) for IG and 57.00±4.91 years (n=110) for CG patients. At the end of the sixth month of the study, 51 participants in the IG and 69 participants in the CG remained (Figure 2).

At baseline of the study all of the participants were sedentary and all fulfilled the inclusion criteria for this study. The sociodemographic characteristics of the participants are given in Table 2.

At baseline no significant differences concerning certain parameters were found between IG and CG's measurements: SMMT scores, diastolic blood pressure, waist and hip circumference, height, body, BMI, resting heart rate, lower extremity muscle strength, lower extremity flexibility, upper extremity flexibility, and balance test ($p>0.05$). The age of IG and the energy consumption, systolic blood pressure and upper extremity muscle strength of CG were higher ($p<0.05$).

Inter-group changes, time dependent changes and group-time changes are given in Table 3.

Discussion

This study evaluated the efficacy of exercise prescription on improving physical activity in patients attending Primary Health Care Centers for different health reasons. Two important features distinguish this study from other studies (18,19). First, the duration and content of the training program provided to the doctors was high (IG=24 hours and CG=14 hours of training on exercise prescription, physical activity and behavior change models). Second, this study utilized a diary-based energy consumption estimate and measured changes in participants' physical performance. Results of this study revealed that educational material-supported exercise prescriptions increased daily energy consumption, and the balance, strength, flexibility and endurance capacity in the IG. This study shows that loss of functional abilities in aging people can be stopped and regained after an intervention.

Health promotion and fighting a sedentary life style are a fundamental part of a national disease prevention policy (20). Doctors and other health care providers have the potential to change the unhealthy lifestyle of patients (8). The World Health Organization and other organizations suggest that health professionals promote physical activity (21). The American College of Sports Medicine has developed a guideline for exercise prescriptions on cardiovascular strength, muscle strength, flexibility, and improving and keeping body constitution, which guides health professionals in their daily, encounters (22).

In this study, estimated daily energy consumption increased in favor of the IG. This finding is congruent with other similar studies (23). Since daily energy consumption is an important criterion in the management of obesity, intervention that included the prescription of exercise would certainly add a beneficial effect to this effort.

Table 3— Inter-group, Time Dependent and Group-time Changes.

	Baseline		3rd Month		6th Month (post-intervention)		Time	Times x Group	Group
	IG	CG	IG	CG	IG	CG			
Energy Consumption (kcal/kg/day)	32.98±0.90	34.53±2.97	33.61±4.33	34.24±1.24	34.52±1.34	33.95±1.10	*$F_{2.116}$=51.279, p<0.001	$F_{2.116}$=7.838, p=0.001	$F_{1.117}$=2.723, p=0.102
Systolic Blood Pressure (mm Hg)	125.00±16.02	132.91±18.49	127.89±16.88	131.93±18.46	122.55±7.10	134.93±14.51	*$F_{2.116}$=177.245, p<0.001	$F_{2.116}$=16.043, p<0.001	$F_{1.117}$=15.084, p<0.001
Diastolic Blood Pressure (mm Hg)	77.17±9.91	74.14±16.60	80.70±8.68	82.17±11.13	79.80±4.69	80.58±13.05	†$F_{2.117}$=5.827, p=0.004	$F_{2.117}$=0.261, p=0.771	$F_{1.118}$=0.950, p=0.332
Waist Circumference (cm)	99.72±13.39	99.07±12.96	96.75±15.02	98.48±11.61	94.63±13.71	100.61±11.95	†$F_{2.117}$=13.724, p<0.001	$F_{2.117}$=8.230, p<0.001	$F_{1.118}$=2.256, p=0.136
Hip Circumference (cm)	111.28±13.10	111.33±12.56	107.99±12.74	109.92±12.83	105.61±11.99	111.93±11.38	†$F_{2.117}$=6.158, p=0.003	$F_{2.117}$=4.545, p=0.013	$F_{1.117}$=4.489, p=0.036
Body Mass Index (kg/m²)	30.26±5.52	29.51±5.36	28.76±4.93	29.69±5.68	28.17±4.68	30.11±6.30	†$F_{2.117}$=18.211, p<0.001	$F_{2.117}$=23.627, p<0.001	$F_{1.118}$=0.965, p=0.328
Resting Heart Rate (beat/min)	78.61±8.89	78.03±7.4	78.63±8.65	79.43±6.77	72.86±7.89	79.48±5.59	†$F_{2.117}$=9.118, p<0.001	$F_{2.117}$=11.292, p<0.001	$F_{1.118}$=4.405, p=0.038
Lower Extremity Muscle Strength (30 second)	14.74±5.35	14.86±4.44	18.46±5.05	12.90±3.87	21.55±4.49	13.91±8.04	†$F_{2.117}$=16.132, p<0.001	$F_{2.117}$=36.985, p<0.001	$F_{1.118}$=33.148, p<0.001
Upper Extremity Muscle Strength	25.74±12.34	42.49±20.70	36.91±12.91	37.11±19.87	43.35±10.30	37.33±18.88	*$F_{2.116}$=32.581, p<0.001	$F_{2.116}$=41.092, p<0.001	$F_{1.117}$=73.290, p<0.001
(Maximum Repetition) Lower Extremity	-4.22±5.44	-2.74±10.24	1.33±5.62	-1.54±10.73	3.45±5.38	-2.54±10.59	†$F_{2.117}$=12.521, p<0.001	$F_{2.117}$=10.922, p<0.001	$F_{1.118}$=3.635, p=0.059
Flexibility (cm) Upper Extremity	-11.35±8.83	-11.58±8.93	-4.40±9.26	-11.58±8.07	-2.06±5.38	-13.00±7.37	†$F_{2.117}$=16.392, p<0.001	$F_{2.117}$=29.096, p<0.001	$F_{1.118}$=22.503, p<0.001
Flexibility (cm) Balance Test (sec.)	36.52±28.84	38.35±31.44	66.67±30.25	39.86±29.35	74.51±25.12	40.25±30.69	†$F_{2.117}$=52.847, p<0.001	$F_{2.117}$=33.347, p<0.001	$F_{1.118}$=21.094, p<0.001

IG (Intervention Group), CG (Control Group), p (p value was used to determine significance level [0,05].)
*Two-way RM-ANCOVA Test, †Two-way RM-ANOVA Test.

The BMI decreased in the IG. The difference in BMI for the CG was not significant ($p>0.05$). Similar findings have been reported in the literature. The decrease in systolic blood pressure has also been reported elsewhere (24).

The decline of pulse rate at rest was significant ($p<0.05$). Similar findings have been reported in the literature, but with a non-significant difference (24). In our study, the significant decline might be an effect of the intervention

Since conditional and physical performance are required in aging people, a home-based exercise program, which includes strength, flexibility and balance exercises, might benefit this special risk group. Our study showed positive improvement in the above mentioned conditional and physical qualities. In our opinion, the physical activity kit developed for this study might be a good instrument for all ages.

We observed in this study that exercise prescription should be supported with materials (25). The instrument developed in this study seems to be an important support for health professionals prescribing exercise and for the patient participating in this process. The instrument might have a positive impact on the outcomes of this study.

In conclusion, this study shows that material supported exercise prescriptions given by the doctors in Primary Health Care Centers improves physical activity levels and makes a positive contribution to the physical performance of individuals/patients. The instrument developed in this study might be an important tool to promote physical activity and sportive conditioning in sedentary people in low resource settings. A country-wide implementation of this health promotion model might have positive primary health implications.

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