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USE OF PEDOMETERS TO PROMOTE PHYSICAL ACTIVITY IN OLDER MEXICAN AMERICAN FEMALES

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Introduction

The World Health Organization cites a sedentary lifestyle as one of the top ten causes of morbidity and mortality worldwide. While interest in physical activity has increased in the United States, the quality and quantity of such activity may not be enough to make a positive impact. It is estimated that more than 60% of adults in the United States do not achieve the recommended physical activity and 25% are not active at all (1, 2). Older adults are less physically active than any other age group (3). As the Baby Boom Generation reaches retirement age, the nation's aging trend will accelerate. By 2050, the proportion of Americans over age 65 will approach 22% - nearly one in four Americans. Furthermore, surveys and government studies have shown that 20% of children in the United States are now overweight or obese (4).

The public is expected to be knowledgeable about the health benefits derived from physical activity, but the elderly should be especially aware that exercise could make the difference between mobility and dependability. Many health ailments reported by the elderly result from a sedentary lifestyle and the lack of proper nutrition. A consistent performance of daily activities such as stair climbing and yard work is associated with a lower risk of death in persons in their seventies and early eighties, additionally, people can prolong their lives without vigorous exercise. Physically active elders have a positive quality of life without disability as compared with sedentary adults (5). For healthy older adults, physical activity has a protective effect against various disease while enhancing levels of functionality.

Exercise does not have to be strenuous; moderate exercise improves sleep quality, decreases pain from arthritis, increases bone density, increases resting metabolism rate, and lowers blood pressure in persons with hypertension (6,7). The confirmed effects of exercise serve as a cue to adopt a healthier lifestyle (8). The quality and type of activity programs an elder individual needs should be considered when planning physical activities, especially for minority groups since there is a lack of participation in such programs.

An important activity that can keep a person healthy or return a person to good health is a walking lifestyle (9). Walking is a basic form of exercise that is simple to do and easily quantified and recognized as the easiest and least expensive form of exercise for sedentary persons (10,11,12). An inactive elderly population can benefit from an individualized walking routine in which their progress can be tracked. Such a walking program can be evaluated with pedometer use. A pedometer is a small sensor that measures movement produced by the number of steps taken throughout a workout or in daily activity. It is inexpensive and simple to use (13).

Adults should engage in 30 minutes of moderate physical activity each day for at least four days out of the week. Pedometer usage to enhance physical activity in older groups has been positive. Regular moderate walking has assisted sedentary persons to lose weight and improved health with small everyday increases in movement (14, 15, 16, 17).

Currently, there is a ground swell of support emerging for the use of pedometers as a motivational and feedback tool; there is a dearth of data on pedometer usage with an older Mexican American population. Since the incidence of chronic diseases is associated with a sedentary lifestyle and obesity in Mexican Americans, studying methods to increase physical activity in an older Mexican American female population has merit. Furthermore, with regard to physical activity, women, especially minority women, engage in less physical activity than men (18). Compared to other ethnic/gender groups, Mexican Americans women were most likely to report no leisure time physical activity at all (19).

We wanted to test if the introduction of a device like a pedometer to an older Mexican American female population would encouraged them to exercise more frequently if at all. We hypothesized that a pedometer would not have any effect on levels of physiological measures produced by a walking program.

Data and Methods.

Study participants were 55 Mexican American females aged 60 - 75. Participants from two community centers were screened, and committed to the 12-week study. A meeting of participants was held to provide information on the benefits of exercise, to answer questions and to conduct a pretest on physiological variables. Variables measured were age, weight, body mass index (BMI), resting blood pressure, resting heart rate, waist girth circumference and predicted max VO2 from non-exercise data (20).

After the pretest, participants were randomly assigned to a treatment or control group. Walking was the form of exercise chosen for this study. Walking was selected because the activity was not complicated and testing or training would not be necessary. Walking often protects against two of the major contributing killers, obesity and high blood pressure, which are among the leading risk factors for heart attack and stroke (21). Walking was also selected because the results of a walking program would facilitate the evaluation of pedometer use. Another rationale was the low impact characteristics of walking and the minimum amount of time needed to implement walking as a variable of this study.

Treatment group participants was given calibrated pedometers and instructed in their function and how they should be worn. The appropriate way of completing the entry logs with pedometer generated data was also provided to facilitate the evaluation of the study. The pedometer was used as a motivational tool to encourage participants to increase the number of steps taken daily.

An analysis of covariance (ANCOVA) was used to analyze data for significance of difference between pretest and posttest group means. Range, mean, and standard deviation were determined to utilize the ANCOVA statistical assessment.

Results

Data were obtained from comparing pretest to posttest results from two different groups. The treatment group included 27 older Mexican American females utilizing pedometers to encourage walking and the control group had 28 older Mexican American females who were just presented with education on the importance of diet and exercise.

Table 1 presents pretest and posttest mean data for both the control and treatment groups. The data were also summarized in ranges, mean values and standard deviations. With the exception of Max V02, the control group had negative results from the pretest to the posttest. The treatment group had positive gains from pretest to posttest with the exception of resting heart rate and Max V02 which had negative gains. While central tendencies determined that pedometers could have had a motivating influence on the treatment group, we chose to determine significance by utilizing an ANCOVA analysis.

Table 1. Pre & Post Group Means

Measurements	Control Pre Test	Control Post Test	Treatment Pre Test	Treatment Post Test
Weight (lbs.)	163.23	165.43	161.20	159.33
BMI	31.18	31.29	32.07	31.51
Blood Pressure Systolic	146.07	147.57	143.67	136.89
Blood Pressure Diastolic	82.96	85.89	84.41	79.59
Resting Heart Rate	69.32	72.68	68.04	68.33
Max VO2	19.93	19.57	18.30	18.83
Waist Girth	37.14	37.84	36.52	36.19

An ANCOVA assessment was chosen to analyze the differences the effects of exercise had on seven selected variables. We wanted to test the prediction that differences in results were related to the selected physiological variables of the treatment group and from the variables of the control group.

Seven ANCOVA tests were performed on data mean summaries. An ANCOVA was used to test for differences between groups, with the posttest measurements as the dependent variable and the pretest measurements as the covariate.

Table 2. Physiological Measurements

Weight				*Post test*		
		Pretest		*Obtained*		*Adjusted*
Group	*n*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*
Treatment	27	161.20	33.59	159.33	33.13	160.46
Control	27	163.23	31.57	165.43	31.52	164.18
p < .05	F=25.60					
BMI				*Post test*		
		Pretest		*Obtained*		*Adjusted*
Group	*n*	*Mean*	*S.D*	*Mean*	*S.D.*	*Mean*
Treatment	27	161.20	33.59	159.33	33.13	31.08
Control	28	31.18	6.26	31.29	6.02	31.65
p > .05	F=1.86					
Systolic Blood Pressure				*Post test*		
		Pretest		*Obtained*		*Adjusted*
Group	*n*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*
Treatment	27	143.67	21.91	136.89	21.69	137.9
Control	28	146.07	24.18	147.57	21.33	146.6
p < .05	F=9.79					
Diastolic Blood Pressure				*Post test*		
		Pretest		*Obtained*		*Adjusted*
Group	*n*	*Mean*	*S.D*	*Mean*	*S.D*	*Mean*
Treatment	27	84.41	15.19	79.59	16.05	79.93
Control	28	82.96	10.29	85.89	11.35	86.53
p < .05	F=13.87					
Resting Heart Rate				*Post test*		
		Pretest		*Obtained*		*Adjusted*
Group	*n*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*
Treatment	27	68.04	9.78	68.33	10.03	69.01
Control	28	69.32	12.40	68.04	9.78	71.88
p > .05	F=2.97					
Predicted Max V02				*Post test*		
		Pretest		*Obtained*		*Adjusted*
Group	*n*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*
Treatment	27	18.30	5.83	18.83	5.83	19.64
Control	28	19.93	4.68	19.57	4.69	18.81
p < .05	F=21.18					
Waist Girth				*Post test*		
		Pretest		*Obtained*		*Adjusted*
Group	*n*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*
Treatment	27	36.52	4.46	36.19	4.46	36.52
Control	28	37.14	3.89	37.84	3.41	37.45
p < .05	F=9.32					

Table 2 presents the summary ANCOVA for the seven variables tested from the control and the treatment groups. The total posttest score with total measured pretest scores as the covariate indicated that the posttest treatment (adjusted means = 160.46) was significantly higher (F = 25.60, p< .05) than those of the control posttest (adjusted means = 164.18**)** for weight loss**;** the posttest treatment (adjusted means = 31.08) was not significantly higher (F = 1.86, p> .05) than those of the control posttest (adjusted means = 31.65) for body-mass-index; the posttest treatment (adjusted means = 137.9) was significantly higher (F = 9.79, p< .05) than those of the control posttest (adjusted means = 146.6) for systolic blood pressure; the posttest treatment (adjusted means = 78.93) was significantly higher (F = 13.87, p< .05) than those of the control posttest (adjusted means = 86.53) for diastolic blood pressure; the posttest

treatment (adjusted means = 69.01) was significantly higher (F = 2.97, p> .05) than those of the control posttest (adjusted means = 71.88) for resting heart rate; the posttest treatment (adjusted means = 19.64) was not significantly higher (F = 21.18, p< .05) than those of the control posttest (adjusted means = 18.81) for Max VO2; the posttest treatment (adjusted means = 36.52) was significantly higher (F = 9.32, p< .05) than those of the control posttest (adjusted means = 37.45) for waist girth.

All seven measurements produced positive change as determined by the ANCOVA analysis. The null hypothesis was rejected for the following variables: weight, BMI, systolic blood pressure, diastolic blood pressure, predicted Max VO2 from non-exercise data, and waist girth circumference. Statistical significance was not proven for BMI and resting heart rate.

Conclusions and Recommendations

The analysis of the findings indicates that the use of pedometers supports positive gains in health indicators for an older female Mexican American population. The variables investigated were associated with chronic diseases and any improvement will lower health risk. Programs like a low-impact pedometer walking program can contribute to a healthy older population. The statistically significant progress indicated by the participants' physical measures demonstrate the importance of some type of physical activity in any population.

It is recommended that the use of pedometers be employed as an enticement to either increase or commence an exercise program. Future investigations of this type should add additional stipulations for participants (such as specific exercise routines and nutritional changes) to facilitate improvement of most measurements used in this study. Utilizing a recommended minimum number of steps per day can further motivate participants to be more active and studying different ethnic groups can make the findings more relevant. It is further recommended that a similar investigation as this study be conducted that extends beyond12 weeks. Utilizing other aids or incentives is recommended for use with an older population.

Abstract

The rates of obesity and related health conditions are rising at an alarming rate, especially among minority populations. Nutrition and physical activity have been particularly linked to the high rates of heart disease and type 2 diabetes. This study was to determine if pedometers promoted daily walking exercise reflected by changes on selected physiological measurements in older Mexican American females. Significance in the study was determined at the 95% level of confidence. The participants for this study were 55 Mexican American females ages 60 to 75 randomly assigned to a treatment or control group. An analysis of covariance was used to examine the data for significance of difference between group means. The variables weight, systolic blood pressure, diastolic blood pressure, predicted Max VO2 and waist girth were influenced by the treatment. The variables BMI and resting heart rate were not influenced by the treatment.

Key words: physical activity, older females, pedometers

Resumen

Las tasas de obesidad y sus condiciones de salud relacionadas con este padecimiento están aumentando de manera alarmante, especialmente en poblaciones minoritarias. La alimentación y la actividad física han sido particularmente asociadas a las altas tasas de enfermedades cardiacas y diabetes tipo 2. Este estudio se realizo para determinar si la promoción del uso de pedómetros en la ejercicio físico diario de mujeres -adultos mayores- mexicoamericanas reflejaban cambios en las mediciones fisiológicas seleccionadas, a una confiabilidad del 95%. Las participantes en

este estudio fue de 55 mujeres mexicoamericanas en edades de 60 a 75 años. Asignadas al azar para un tratamiento de casos y controles. Un análisis de covarianza fue usado para examinar los datos para observar sus diferencias entre los valores medios. Las variables peso, presión sanguínea sistólica, presión sanguínea diastólica, Max VO2 y la medida de cintura se vieron influidas por el tratamiento. Las variables Índice de Masa Corporal y frecuencia cardiaca en reposo no se vieron influenciadas por el tratamiento.

Palabras calve: actividad física, adultos mayores, pedómetros

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