

Physical activity and its association with chronic diseases in the elderly in 11 cities of Peru

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Abstract

Aim: The aim of the study was to determine the frequency of physical activity and its association with chronic diseases in the elderly in 11 cities of Peru. **Methods:** A cross-sectional study of secondary data was conducted; the dependent variable was not the realization of physical activity, chronic disease, and other physio-anthropometric variables were independent variables. For bivariate and multivariate analysis, generalized linear models were used. A confidence level of 95% and $p < 0.05$ as statistically significant was considered. **Results:** Of the 1030 elderly, 68% (698) did not perform physical activity. When performing the multivariate model was obtained for every year of age increased by 1.5% frequency do physical activity (RPA: 1.015, 95% CI 1.006–1.024, $p = 0.001$) for each additional centimeter waist decreased 0.6% performing physical activity (RPA: 0.994, 95% CI: 0.992–0.997, $p < 0.001$) and those suffering from other chronic heart disease (RPA: 1.15, 95% CI: 1.02–1.30, $p = 0.019$) had higher frequencies of no physical activity, adjusted for sex and city of residence. **Conclusion:** No physical activity was associated with suffering from some heart disease, older age, and waist circumference. We need to consider these results from the study to promote physical activity in this population.

KEY WORDS: Aged. Motor activity. Chronic disease.

Introduction

Population aging is a demographic characteristic of the 20th century, which is a consequence of improved living conditions, but that, in turn, is accompanied by a predominance of non-communicable chronic diseases at older ages¹. According to the World Health Organization Global Status Report on Noncommunicable Diseases 2014, they are the main cause of death in the world, with 68% of deaths in the year 2012, especially affecting middle and low-income countries². In Latin America, the aging process is characterized by its accelerated rate, in comparison with developed countries³; in Peru, the last national census reveals that 38.3% of households have at least

one person older than 60 years, and of this population, 71.4% of males and 80.2% of females have some chronic health problem, with females of rural areas showing greater health deterioration in comparison with those who live in Metropolitan Lima⁴.

Although physical activity cannot stop the normal biological process of aging, there is evidence that it can reduce the progression of chronic conditions and minimize the effects of sedentarism^{5,6}. According to the American College of Sports Medicine and the American Heart Association, older adults should have at least 30 min of moderate to vigorous physical activity every day, consisting of recreational or leisure activities, displacements or occupational activities (in case of still working), among others^{3,7,8}. It is due to this that approximately 3.2 million deaths occur every year

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Table 1. Population demographics

City	Natural region*	Total population*	Mean altitude (meters above sea level)*	Socioeconomic status†
Piura	Coast	1,784,551	29	Regular
Chiclayo	Coast	716,732	27	Regular
Lima	Coast	9,752,000	154	Acceptable
Huancayo	Mountains	323,054	3271	Regular
Cajamarca	Mountains	162,326	2750	Poor
Huánuco	Mountains	149,210	1800	Poor
Cusco	Mountains	348,935	3390	Regular
Puno	Mountains	120,229	3815	Poor
Cerro de Pasco	Mountains	70,000	4330	Very poor
La Rinconada-Puno	Mountains	50,000	5100	Extreme poverty

*Source: Instituto Nacional de Estadística y Demografía, año 2007.

†Source: Fondo de Cooperación Para el Desarrollo Social: Quintiles de pobreza.

as a consequence of not practicing physical activity; moreover, the importance of physical activity for this group lies in that it can decrease the risk of mortality associated with cardiovascular diseases, type II diabetes, obesity, cancer, dementia, and depression^{2,9-12}, even with low-intensity activities such as walking. In addition, the studies that address physical activity in older people confirm that those who are physically active have a lower probability to experience any functional limitation in comparison with those who are sedentary^{12,13}.

It is for the above-mentioned reasons that the purpose of our study was to determine the frequency of physical activity and its association with chronic conditions in older people from 11 cities of Peru.

Methods

A study of the analytical, cross-sectional type was carried out, deriving from a secondary data analysis. The analyzed database corresponded to a research the main purpose of which was to assess the association between high blood pressure and residence altitude in Peru.

The data were obtained from surveys applied to patients attending the cardiology outpatient clinic of health establishments (public hospitals) from the following Peruvian cities: Piura, Chiclayo, Lima, Huancayo, Loreto, Cajamarca, Huánuco, Cusco, Puno, Cerro de Pasco, and La Rinconada-Puno (Table 1). The type of sampling was non-random. Data from elderly patients who answered to the study main variable (not having physical activity) were included.

The main variable was considered according to not having a regular physical activity or having at least 30 daily min 3 times a week (answer categories: Yes/no). For the search of factors associated with the performance of physical activity, the gender (male/female), age (regarded as a quantitative variable for the analysis), and physio-anthropometric (systolic/diastolic blood pressure, body mass index and waist circumference, and all regarded as quantitative) variables were also considered, as well as suffering from medically-diagnosed chronic conditions (high blood pressure, diabetes mellitus, dyslipidemia, and any other heart condition).

The protocol was approved by the Hospital Nacional San Bartolomé Ethics Committee (OFICIO N°: 2845-DG-OADI-N° 822). Once the database was received, it underwent a quality control procedure; this was performed by two separate authors (who verified the data according to those obtained in surveys), who pooled the data in a single matrix (after ascertaining that the data matched). All this was carried out using an Excel datasheet (version 2010 for Windows). The statistical analysis was performed with the Stata program, version 11.1 (Stata Corp, Texas, USA). For the description of numerical variables, their normality was determined with the Shapiro Wilk statistical test, with the median and interquartile ranges. For the description of categorical variables, frequencies and percentages were used.

For the bivariate analysis, p values, crude and adjusted prevalence ratios (aPR) and 95% confidence intervals (95% CI) were obtained. Generalized linear models were used, with the Poisson family and the

log link function, in addition to accounting for the singularity of the surveyed populations; the site of the surveyed subject was used as a cluster. A level of confidence of 95% and a $p < 0.05$ was considered to be statistically significant.

Results

Of the 1030 surveyed subjects, 52.7% (543) were of the female gender, and median age was 68 years (interquartile range: 64-74 years). Of the sample, 32.8% (338) had high blood pressure, 12.7% (130), diabetes mellitus, 23.3% (238) dyslipidemia, and 13.0% (133), some other chronic heart condition. The other descriptive values are shown in table 2.

Up to 67.8% of the elderly subjects (698) referred not practicing physical activity. When the bivariate analysis of this variable with the secondary variables was performed, gender ($p = 0.015$), age ($p = 0.001$), waist circumference ($p < 0.001$), and suffering from other chronic heart condition ($p = 0.014$) were found to be associated, as shown in table 3.

When the multivariate model was applied, we found that, for each year of age, the frequency of not having physical activity was increased by 1.5% (aPR: 1.015; 95% CI: 1.006–1.024; $p = 0.001$); for each additional waist centimeter, the performance of physical activity was decreased by 0.6% (aPR: 0.994; 95% CI: 0.992–0.997; $p < 0.001$); and those who suffered from other chronic heart condition (aPR: 1.15; 95% CI: 1.02–1.30; $p = 0.019$) had higher frequencies of not having physical activity, adjusted by gender and city of residence.

Discussion

At present, sedentary life has become generalized as a predominant characteristic and, concomitantly, an increase in chronic conditions that constitute the main cause of death in all regions of the world has also become widespread^{14,15}, in spite of the fact that physical exercise has been shown to prevent the occurrence of multiple pathologies and conditions that bring direct and indirect consequences to society¹⁶.

The findings of our study demonstrate that age is related to practicing physical activity, which is consistent with Berkemeyer et al.¹⁷ findings in a study conducted in the United Kingdom and USA in a population of 4052 and 3459 older adults with ages ranging from 49 to 91 and 49 to 85 years, respectively, which revealed that physical activity frequency and intensity

Table 2. Pathophysiological characteristics of the elderly subjects surveyed in 11 Peruvian cities

Variable	n	%
Gender		
Male	52.7	543
Female	47.3	487
Age (years)*	68	64–74
Systolic blood pressure (mmHg)*	120	110–130
Diastolic blood pressure (mmHg)*	72.8	66–80
Body mass index (kg/m ²)*	26.3	23.8–29
Waist circumference (cm)*	92	82–100
Suffers from:		
High blood pressure	338	32.8
Diabetes mellitus	130	12.7
Dyslipidemia	238	23.3
Other chronic heart condition	133	13.0

*Median and interquartile range.

change throughout life, with it being significantly lower as age advances¹⁷. This is ratified by two local studies that showed that age increase is associated with a higher risk for cardiovascular events and for developing metabolic syndrome among Peruvian workers^{18,19}. Therefore, age increase is considered to be a risk factor for the development and progression of most chronic conditions, with regular physical activity being a substantial modifier of these risks⁵. This should be especially taken into account by the promoters of programs for the elderly and others alike, in order for efforts to be directed to older adults with programs tailored according to their physical possibilities, in addition to other strategies to stimulate the practice of constant physical activity.

Waist circumference was also found to be associated with performing physical activity, which is consistent with the study by Villalobos and García²⁰, who found that, as age advances, lean mass decreases and fat mass increases, and it is mainly redistributed to the abdominal zone, thus constituting abdominal obesity, which might decrease exercise capability. In addition, central adiposity would be related to an increase in the morbidity and mortality of several chronic conditions such as hypertension, coronary artery disease, and type II diabetes²⁰.

Finally, subjects with a chronic heart condition had less physical activity ($p = 0.014$). Espinoza et al.²¹ applied a 12-month rehabilitation program that included physical exercise in 113 patients with a history of low-risk myocardial infarction and observed an improvement in the quality of life and effort tolerance.

Table 3. Bivariate analysis of the association between chronic diseases and lack of physical activity in elderly subjects from 11 cities of Peru

Variable	Physical activity*		cPR (95% CI)	p
	Yes, n (%)	No, n (%)		
Gender				
Male	388 (55.6)	155 (46.7)	1.12 (1.02–1.23)	0.015
Female	310 (44.4)	177 (53.3)		
Age (years) [†]	64 (64–75)	66 (62–72)	1.016 (1.011–1.021)	0.001
Systolic blood pressure (mmHg) [†]	120 (110–130)	120(105–130)	1.003 (0.999–1.007)	0.185
Systolic blood pressure (mmHg) [†]	75 (68–80)	70 (65–80)	1.004 (0.998–1.011)	0.195
Diastolic blood pressure (mmHg) [†]	75 (68–80)	70 (65–80)	1.004 (0.998–1.011)	0.195
Body mass index (kg/m ²) [†]	26 (23.7–28.9)	26.5(23.9–29)	0.996 (0.989–1.003)	0.295
Waist circumference (cm) [†]	91 (80.5–99)	94 (86–101)	0.994 (0.991–0.997)	< 0.001
Suffers from				
High blood pressure	245 (35.1)	93 (28.0)	1.11 (0.94–1.31)	0.230
Diabetes mellitus	100 (14.4)	30 (9.1)	1.16 (0.94–1.42)	0.172
Dyslipidemia	164 (23.6)	74 (22.8)	1.01 (0.93–1.11)	0.771
Other chronic heart condition	105 (15.1)	28 (8.5)	1.19 (1.04–1.37)	0.014

*Regarded as having regular physical activity for at least 30 min per day 3 times a week.

[†]Median and interquartile range.

95% CI: 95% confidence interval; cPR: crude prevalence rate.

95% CI and P values obtained with generalized linear models, with Poisson family, log link function, robust models and taking each site into account as cluster group.

Different studies have found physical activity to be associated with a 35% reduction in the risk for cardiovascular disease in men and women and, in addition, there is a reduction in the risk for metabolic and cardiorespiratory diseases; this benefits might be due in part to the fact that exercise has anti-inflammatory effects^{22,23}. Other studies on the prescription of exercise as prevention and therapy in chronic conditions confirm that it reduces cardiac mortality by 26%, in addition to decreasing total cholesterol, triglycerides, blood sugar, obesity, stress, and systolic blood pressure, among other benefits; and it even seems recommendable introducing resistance exercise in the rehabilitation of patients with heart failure, taking into account each patient's particularities²⁴⁻²⁶. All this ratifies what we found in the study, which may provide values that are specific to our part of the world in order for interventional studies or prevention programs to be subsequently carried out in this population.

The study had the limitation that, since it was an analysis of secondary data, we could not have access to other important variables, such as knowing if the participants were enrolled in an older adult program or the level of family support. In addition, the selection bias makes it impossible for the confidence intervals to be accurately used. In spite of these limitations, the results are important because they reflect a reality in

an important amount of elderly population from different Peruvian cities.

According to the found results, it is concluded that not having physical activity in the elderly is associated with suffering from any heart condition, older age, and waist circumference. Therefore, it is important to promote the performance of physical activity through programs directed to this population group, to be able to delay or significantly reduce the risk for the occurrence of chronic conditions, this way being able to decrease mortality.

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