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Correlation of the Distance Traveled in the 6-Minute Walk and Charlson and Elixhauser Comorbidity Scores

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Abstract

Introduction: The walking test of 6 minutes (6MW) is a test that merges the answer of different systems (respiratory, cardiovascular, metabolic, skeletal muscle and neurosensorial) and offers an useful objective result to lead therapeutic measurements and stablish a prognosis, it's possible that the comorbid patient lowers their functional reserve and alters the result of the test not only because of the presence of pathologies cardiorespiratory, nevertheless, information about the correlation between the scores of comorbidity and the traveled distance in the 6MW is limited.

Objective: Determine the correlation between the traveled distance in the 6MW and the scores of comorbidities of Charlson and Elixhauser.

Methods: A cross-sectional study was made, in patients taken to the 6MW made between 2006 until March 2020, in a hospital of high complexity; there were included patients older than 18 years old, whose clinic history record and walk of 6 minutes were available. The index of Charlson and Elixhauser were calculated in the 6MW, a bivariate analysis was made between the antecedents of pathologies and the traveled distance, independently and adjusted, the spearman correlation coefficient was calculated for the different scores and the distance in meters of the 6MW, was considerate a significative p: <0.05.

Results: To the final analysis 491 subjects entered, the average age was of 69 years old (sd: 14.9), 54% male, the 15.3% had an abnormal walk less than the 80% of the expected, the diseases that were considered had a statistically significant relation with the decrease of the distance in the 6MW were arterial hypertension (p: <0.001), chronic heart failure (p=0.037), heart arrhythmia (p=0.003), smoking (p=0.022), chronic pulmonary obstruction disease (p: <0.001), dementia (p=0.03) diabetes mellitus with target organ damage (p=0.01), moderate to severe chronic kidney disease (p=0.012), obesity (p=0.036) y lymphoma (p=0.038) the spearman correlation coefficient between the traveled distances and Charlson was of -0.343 (IC95%:-0.420 -0.264)(p: < 0.001) and -0.213(IC95%:-0.285 -0.116)(p: <0.001) with the Elixhauser index.

Conclusion: The distances walked in meters in the 6MW has a reverse low correlation with the comorbidity index, the diseases that were not cardiopulmonary and that related independently with changes in the traveled distance are smoking, dementia, diabetes mellitus, chronic kidney disease, obesity, and lymphoma.

Keywords: Comorbidities; Walk; Test; Cardiopulmonary; Charlson; Elixhauser

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Introduction

The 6-minute walk test is a cardiopulmonary function test considered a submaximal stress test, which aims to evaluate the maximum distance that a subject can travel in a period of 6 minutes as fast as possible, both on the band and in corridor [1]; This test has gained importance in the evaluation of functional exercise capacity in patients with chronic lung disease, since it has proven to be reliable, inexpensive, safe and easy to apply [2], to evaluate possible outcomes including death [2], the distance traveled in the 6-minute walk has been compared with the FEV1 of spirometry and the left ventricular ejection fraction to evaluate chronic cardiac and respiratory pathologies [3].

Currently the test is carried out in a 30-meter-long corridor on a flat surface and seeks to assess in an integrated way the response of different systems, including the respiratory, cardiovascular, metabolic, skeletal muscle and neurosensory systems, which develop the subject during exercise [4]. There are multiple pathologies that contribute to a deterioration of these systems and therefore to a reduction in functional capacity, reducing the distance traveled not only for cardio-respiratory diseases, but also for terminal chronic kidney disease, diabetes mellitus, among others; Additionally, a relationship has been observed between the distance of the 6-minute walk and the deterioration of functional class (NYHA); as markers of poor prognosis, as well as decreased mobility when it is less than 300 meters, increasing the risk of mortality and the need for transplantation in the case of patients with heart failure [5].

Other tools used for the evaluation of comorbid patients where several systems may be affected are comorbidity scores, the Charlson index, one of the most used and validated, finds a progressive reduction in survival rate with increasing score [6]. However, other scores have been developed, including the Elixhauser index that also assesses comorbidities and their length of stay, hospital costs and mortality. However, these tools ultimately seek to assess a functional reserve in the patient with comorbidity and where it has been achieved their evaluation with some objectivity [7,8].

The 6-minute walk, being a standardized test that relates a shorter distance walked with a lower survival associated with a decrease in functional class, could be related to the compromise of one or more systems in subjects with comorbidities, however, the possible correlation Between scores that evaluate the degree of comorbidity and prognosis with this test, it is not completely known, in addition, it is possible that in the comorbid patient his functional reserve is decreased, not only by one but by several diseases altogether. The objective of the present study is to determine the correlation between the distance walked in meters in the 6-minute runner test and the Charlson and Elixhauser comorbidity scores.

Methodology

A cross-sectional study was carried out in patients taken for a 6-minute walk, carried out between 2006 and March 2020, in a third-level hospital in Bogotá; Patients over 18 years of age, whose clinical history record and 6-minute walk will be available, were included, subjects with incomplete information from the 6-minute walk report or double record were excluded.

6-minute walk test

The 6-minute walk was carried out according to the guidelines established by the American Thoracic Society [9]. Prior to its start, it was guaranteed that the participants had not exercised 2 hours before the test, in addition to the use of appropriate clothing. The initial explanation of the test was carried out, which was carried out in a flat, straight corridor, with a regular surface with a demarcated length of 30 meters, which was free of traffic and with permanent surveillance for assistance in case of emergency. 2 tests were carried out on the same day with a difference of at least 60 minutes, the initial test was taken as practice. The number of laps achieved was counted, as well as the measurement of the heart rate and oxygen saturation before the test and at the end, and the dyspnea and Borg fatigue scale questionnaires.

Study variables

The study variables were those necessary for the construction of the Charlson and Elixauser scores, which include age, sex, cardiovascular history, respiratory diseases, history of smoking and alcohol, drug abuse, neurological pathology, gastrointestinal history, metabolic diseases, obesity, coagulopathies and hematological alterations, HIV infection, tuberculosis, the variables of the 6-minute walk include dyspnea according to mrc, vital signs of heart rate, systolic blood pressure, diastolic blood pressure, oxygen saturation at the beginning and at the end of the test, in addition Borg dyspnea and fatigue score were included.

Charlson index

The Charlson index was calculated to measure prospectively the impact of comorbidity on mortality. Its elaboration was based on comorbidities such as angina pectoris, myocardial infarction, congestive heart failure, valvular arrhythmias, arterial hypertension, cerebrovascular disease, hemiplegia, dementia, chronic obstructive pulmonary disease, diabetes mellitus, chronic kidney disease, liver disease, ulcer peptic, gastrointestinal bleeding, acquired immunodeficiency syndrome, lymphoma, leukemias, leukemias, rheumatological disease, coagulopathies among others [6]. Its classification is established from 0 to 1, 1 to 2, 2 to 3 and greater than 3, where with the gradual increase in the score there is a gradual increase in cumulative mortality related to comorbidities [10].

Elixhauser index

The Elixhauser Comorbidity Index is a method for categorizing patient comorbidities based on the coding of the International Classification of Diseases. Each category of comorbidity is dichotomous, whether it is present or not. This index can be used for the prediction of resources and in-hospital mortality, this index uses 30 categories in total which were previously described in the inclusion criteria of this study, which are measured as dichotomous variables, each one representing one of comorbidity groups [7,11].

Bias control

The personnel who carried out the 6-minute walk are experts in pulmonary function tests, and the data collection was obtained directly from the reported records of the 6-minute walk, by 2 researchers who performed double verification for the data entry. In the study, the history of comorbidities was verified directly from the patients' medical history records. The different devices used for the 6-minute walk were calibrated prior to the tests carried out.

Statistical analysis

A description of the study variables was initially made, where the quantitative variables were summarized in mean and standard deviation if their distribution was normal or median and interquartile range if they did not meet normality criteria, the qualitative variables were summarized in frequency and percentages, the Quantitative variables were compared with Student's t or Mann Witney's U according to their distribution, qualitative variables were compared using chi2, subsequently a correlation was made between the distance walked in meters and the score of each comorbidity index.

Ethical aspects

The present study was considered a risk-free investigation according to the definitions given by resolution 8430 of the national health ministry and was approved by the institutional ethics committee.

Results

505 potentially eligible subjects were found, entering the final analysis 491 subjects, in figure 1, it describes the entry flow of subjects to the study.

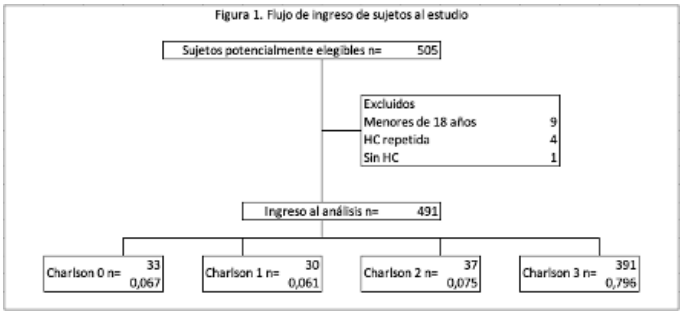


Figure 1: Entry flow chart of the study subjects.

General characteristics of the population

The average age of the population was 69 years (14.9 SD), where 54% (265) subjects were male, the most frequent disease was hypertension with 70% and the second was COPD with 48% , between the comparison of a normal and abnormal walk, significant differences were found in the pathologies of: arterial hypertension, history of acute myocardial infarction, COPD, mild chronic kidney disease, moderate liver disease showed a p of 0.053, the other characteristics of the population are shown in Table 1.

Table 1: General characteristics of the population.

	Population total n= 491	Abnormal walk n= 75	Normal hike n=416	Value p*
Age x (ds)	69 (14.9)	57.6 (23.1)	71 (11.7)	0.000
Male gender n (%)	265 (54)	38 (51)	227 (74)	0.533
Background n (%)				
Arterial hypertension	345 (70)	38 (51)	307 (74)	0.000
Chronic heart failure	102 (21)	16 (21)	86 (21)	0.897
Cardiac arrhythmia	93 (19)	15 (20)	78 (19)	0.799
Heart valve disease	28 (6)	5 (7)	23 (6)	0.696
Acute myocardial infarction	92 (9)	7 (9)	85 (20)	0.023
Peripheral vascular disease	25 (5)	2 (3)	23 (6)	0.299
Current smoker	10 (2)	2 (3)	8 (2)	0.675
Former smoker	164 (33)	18 (24)	146 (35)	0.061
Chronic obstructive pulmonary disease	285 (58)	30 (40)	255 (61)	0.001
Pulmonary hypertension	95 (19)	19 (25)	76 (18)	0.154
Asthma	44 (9)	4 (5)	40 (10)	0.232
Sleep apnea-hypopnea syndrome	96 (29)	11 (15)	85 (20)	0.246
Cerebrovascular disease	48 (10)	5 (7)	43 (10)	0.325
Dementia of any etiology	48 (10)	12 (9)	39 (9)	0.481
Other neurological diseases	36 (7)	6 (8)	30 (7)	0.809
Hemiplegia	2 (0)	1 (1)	1 (0)	0.171
Peptic ulcer	11 (2)	0 (0)	11 (3)	0.555
Liver disease	9 (2)	3 (4)	6 (1)	0.129
Mild chronic liver disease	5 (1)	1 (1)	4 (1)	0.768
Moderate or severe liver disease	4(1)	2 (3)	2 (0)	0.053
Mellitus diabetes	116 (24)	15 (20)	101 (24)	0.422
Diabetes Mellitus without target organ damage	81 (16)	11 (15)	70 (17)	0.643
Diabetes Mellitus with target organ damage	36 (7)	5 (7)	31 (7)	0.81
Chronic kidney disease	101 (21)	12 (16)	89 (21)	0.287
Mild chronic kidney disease	39 (8)	1 (1)	38 (9)	0.021
Moderate-severe chronic kidney disease	63 (14)	11 (15)	52 (13)	0.606
Kidney Replacement Therapy (Dialysis)	14 (3)	3 (4)	11 (3)	0.516
Rheumatoid arthritis or connective tissue disease	55 (11)	11 (15)	44 (11)	0.301
Hypothyroidism	179 (36)	23 (31)	156 (37)	0.258
Obesity	98 (20)	10 (13)	88 (21)	0.119
Abnormal weight loss or malnutrition	32 (7)	6 (8)	26 (6)	0.572
Coagulopathy	11 (2)	3 (4)	8 (2)	0.263
Anemia from blood loss	2 (0)	1 (1)	1 (0)	0.171
Anemia of any other cause	42 (9)	9 (12)	33 (8)	0.246
Fluid and electrolyte disturbance	10 (2)	2 (3)	8 (2)	0.675
HIV infection	2 (0)	0 (0)	2 (0)	0.812
AIDS	0 (0)	0 (0)	0 (0)	0
Tuberculosis	19 (4)	4 (5)	15 (4)	0.475
Any solid tumor without metastasis	87 (18)	16 (21)	71 (17)	0.373
Metastatic cancer	17 (3)	1 (1)	16 (4)	0.273
Leukemia	6 (1)	1 (1)	5 (1)	0.924
Lymphoma	4 (1)	0 (0)	4 (1)	0.733
Alcoholism	7 (1)	0 (0)	7 (2)	0.646
Schizophrenia or Bipolar Affective Disorder	5 (1)	1 (1)	4 (1)	0.768
Drug and psychoactive substance abuse	0 (0)	0 (0)	0 (0)	0
Depression	19 (4)	2 (3)	17 (4)	0.557

* Statistical significance <0.05.

6-minute walk features

The total average walk was 410 meters. the highest percentage of subjects was between dyspnea 1 and 2. and fatigue was also between 0 and 1. the findings of the 6-minute walk are observed in Table 2.

Table 2: Characteristics of the 6-minute walk of the population.

		Population total n= 491	Abnormal walk n= 75	Normal hike n= 416	Value p
Weight x (ds)		68.85 (13.51)	64.9 (13.1)	69.6 (13.5)	0.005
Size		158.43 (8.66)	159.9 (10.3)	158.2 (8.3)	0.167
MRC dyspnea (%)	0	58 (12)	6 (10)	52 (10)	0.001
	1	172 (35)	14 (20)	158 (40)	
	2	97 (20)	17 (20)	80 (20)	
	3	84 (17)	16 (20)	68 (20)	
	4	81 (16)	22 (30)	59 (10)	
Meters walked		410.09 (110.3)	309.8 (144.9)	428.1 (91.9)	0.000
FEV1 (%)		79.39 (44.17)	59.4 (25.7)	82 (45.4)	0.000
BMI		27.47 (5.09)	25.5 (5)	27.8 (5)	0.000
HR max		151.01 (14.68)	162.5 (22.4)	148.9 (11.7)	0.000
Foretold		569.19 (103)	642.9 (160.8)	555.9 (82.1)	0.000
% predicted		0.72 (0.17)	0.5 (0.1)	0.8 (0.1)	0.000
TAS Rest		121.96 (15.13)	116.5 (16)	122.9 (14.8)	0.001
TAD rest		72.75 (10.98)	73.3 (11)	72.7 (11)	0.641
HR rest		77.26 (12.84)	79.2 (14.9)	76.9 (12.4)	0.207
FR rest		19.8 (3.73)	20.1 (4)	19.7 (3.7)	0.384
FiO_2 rest		0.22 (0.03)	0.2 (0)	0.2 (0)	0.024
$SatO_2$ resting		89.38 (4.34)	90.1 (4.6)	89.2 (4.3)	0.108
Dyspnea at rest (%)	0	292 (59)	37 (50)	255 (60)	0.339
	0.5	26 (5)	5 (10)	21 (10)	
	1	48 (10)	8 (10)	40 (10)	
	2	55 (11)	7 (10)	48 (10)	
	3	47 (10)	13 (20)	34 (20)	
	4	10 (2)	2 (0)	8 (0)	
	5	7 (1)	1 (0)	6 (0)	
	6	2 (0)	1 (0)	1 (0)	
	7	4 (1)	1 (0)	3 (0)	
	8	1 (0)	0 (0)	1 (0)	
Rest fatigue (%)	0	338 (69)	40 (50)	298 (70)	0.028
	0.5	23 (5)	4 (10)	19 (0)	
	1	29 (6)	4 (10)	25 (10)	
	2	38 (8)	12 (20)	26 (10)	
	3	32 (7)	5 (10)	27 (10)	
	4	13 (3)	4 (10)	9 (0)	
	5	9 (2)	2 (0)	7 (0)	
	6	1 (0)	0 (0)	1 (0)	
	7	4 (1)	2 (0)	2 (0)	
	8	2 (0)	1 (0)	1 (0)	
	10	3 (1)	1 (0)	2 (0)	
TAS final		135.79 (79.94)	121 (20.7)	138.3 (85.3)	0.000
TAD final		75.63 (12.82)	74.1 (15.6)	75.9(12.3)	0.357

FC final		96.17 (19.55)	96.1 (20.7)	96.2 (19.4)	0.993
FR final		25.13 (5.55)	26.1 (6.4)	25 (5.4)	0.147
FiO2 final		0.22 (0.03)	0.2 (0)	0.2 (0)	0.024
SatO2 final		86.05 (7.29)	86.7 (8.7)	85.9 (7)	0.459
Final dyspnea	0	95 (19)	9 (10)	86 (20)	0.005
	0.5	26 (5)	1 (0)	25 (10)	
	1	45 (9)	7 (10)	38 (10)	
	2	76 (15)	16 (20)	60 (10)	
	3	108 (22)	15 (20)	93 (20)	
	4	47 (10)	2 (0)	45 (10)	
	5	34 (7)	7 (10)	27 (10)	
	6	9 (2)	2 (0)	7 (0)	
	7	23 (5)	5 (10)	18 (0)	
	8	7 (1)	3 (0)	4 (0)	
	9	4 (1)	1 (0)	3 (0)	
Final fatigue	0	170 (35)	19 (30)	151 (40)	0.052
	0.5	23 (5)	2 (0)	21 (10)	
	1	41 (8)	7 (10)	34 (10)	
	1.5	1 (0)	0 (0)	1 (0)	
	2	69 (14)	12 (20)	57 (10)	
	3	62 (13)	12 (20)	50 (10)	
	4	37 (8)	5 (10)	32 (10)	
	5	32 (7)	3 (0)	29 (10)	
	6	9 (2)	1 (0)	8 (0)	
	7	20 (4)	4 (10)	16 (0)	
	8	9 (2)	2 (0)	7 (0)	
	9	3 (1)	0 (0)	3 (0)	
	10	16 (3)	8 (10)	8 (10)	
Charlson categories	0	33 (7)	17 (20)	16 (10)	0.000
	1	30 (6)	7 (10)	23 (10)	
	2	37 (8)	9 (10)	28 (10)	
	3	391 (80)	42 (60)	349 (80)	

* Statistical significance <0.05. SAT (Systolic Blood Pressure). TAD (Diastolic Blood Pressure). HR (Heart Rate). FR (Respiratory rate). SatO2 (Oxygen Saturation).

Within the characteristics of the test. statistically significant differences were found in the variables of: weight. FEV 1 (%). body mass index. maximum HR. SBP at rest. final SBP. Likewise. at the end of the test. most of the patients showed a dyspnea score between 2 and 3. for those with an abnormal walk. the patients with normal walk were between 0 and 3. the majority. Regarding the fatigue score by Borg. the subjects with abnormal walking were found between 0.2 and 3. and those with a normal test gave scores between 0 and 1. The Charlson index in both groups was found with a score of 3 with significant differences between both groups. The other data are completed in table 2.

Distance walked due to pathology

The pathologies in which there is a difference in the distance walked are: arterial hypertension. chronic heart failure. cardiac arrhythmia. smoking and a history of it. COPD. dementia. hemiplegia. diabetes mellitus with microvascular complications. moderate to severe chronic kidney disease and in therapy renal replacement. the presence of obesity and lymphoma. The other variables are described in Table 3.

Among the variables in multivariate analysis that continue to be significant were arterial hypertension and the presence of chronic

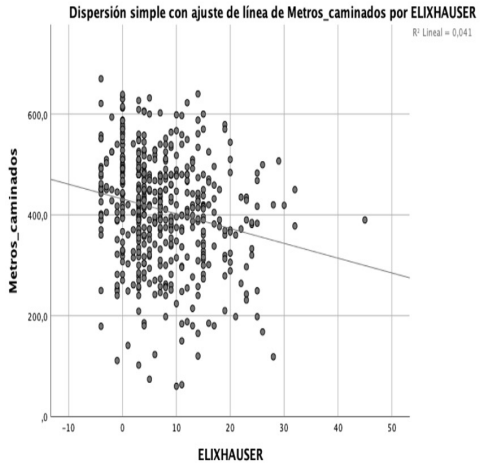
Table 3: Meters walked by comorbidity.

	Number of subjects with pathology n (%)	Distance walked with pathology x (ds)	Distance walked without pathology x (ds)	Difference	Value p
Hypertension meters walked x (ds)	345 (70)	394.9 (106.2)	446.2 (111.5)	51.3	0
Chronic heart failure	102 (21)	389.6 (111.8)	415.5 (109.3)	26	0.034
Cardiac arrhythmia	93 (19)	379.3 (110.9)	417.3 (109.1)	38	0.003
Heart valve disease	28 (6)	403.8 (101.4)	410.5 (110.8)	6.7	0.754
Acute myocardial infarction	92 (19)	397.8 (98.7)	413 (112.7)	15.2	0.235
Peripheral vascular disease	25 (5)	390 (102)	411.2 (110.7)	21.2	0.35
Current smoker	10 (2)	485.8 (105.1)	408.6 (109.9)	77.2	0.028
Former smoker	164 (33)	413.9 (107.7)	408.3 (111.6)	5.6	0
Chronic obstructive pulmonary disease	285 (58)	389.2 (106.4)	439 (109.2)	49.8	0
Pulmonary circulation disease (pulmonary hypertension)	95 (19)	379.7 (106.4)	417.4 (109.2)	37.7	0.003
Asthma	44 (9)	438.9 (104.4)	407.3 (110.5)	31.5	0.07
Sleep apnea-hypopnea syndrome (OSAHS)	96 (20)	422.2 (113.8)	407.2 (109.3)	15	0.231
Cerebrovascular disease	48 (10)	386.4 (113.6)	412.7 (109.7)	26.3	0.115
Dementia of any etiology	48 (10)	376.1 (115.2)	413.8 (109.2)	37.7	0
Other neurological diseases	36 (7)	390 (86.5)	411.7 (111.8)	21.7	0.158
Hemiplegia	2 (0)	264 (8.5)	410.7 (110.1)	146.7	0
Peptic ulcer	11 (2)	428.9 (107.1)	409.7 (110.4)	19.2	0.568
Liver disease	9 (2)	366.9 (118.1)	410.9 (110.1)	44.1	0.235
Mild chronic liver disease	5 (1)	391.6 (98.7)	410.3 (110.4)	18.7	0.706
Moderate or severe liver disease	4 (1)	336.0 (148)	410.7 (109.9)	74.8	0.314
Mellitus diabetes	116 (24)	393.2 (119.7)	415.4 (106.8)	22.2	0.058
Diabetes Mellitus without target organ damage	81 (16)	402.7 (122.7)	411.6 (107.7)	8.9	0.508
Diabetes Mellitus with target organ damage	36 (7)	364 (117.8)	413.8 (108.9)	49.8	0.009
Chronic kidney disease	101 (21)	395.7 (110.7	413.9 (110)	18.2	0.139
Mild chronic kidney disease	39 (8)	425.1 (107.6)	408.8 (110.5)	16.2	0.378
Moderate-severe chronic kidney disease	63 (13)	378.3 (108.9)	414.8 (109.8)	36.5	0.014
Kidney Replacement Therapy (Dialysis)	14 (3)	390.4 (97.5)	410.7 (110.6)	20.3	0.005
Rheumatoid arthritis or connective tissue disease	55 (11)	408.6 (89.2)	410.3 (112.7)	1.8	0.893
Hypothyroidism	179 (36)	398.9 (112.7)	416.6 (108.5)	17.6	0.088
Obesity	98 (2)	388.9 (113.9)	415.4 (108.8)	26.5	0.033
Abnormal weight loss or malnutrition	32 (7)	395.9 (97.9)	411.1 (111.1)	15.2	0.45
Coagulopathy	11 (2)	368.2 (98.1)	411.1 (110.4)	42.9	0.202

Anemia from blood loss	2 (0)	339 (80.6)	410.4 (110.3)	71.4	0.213
Anemia of any other cause	42 (9)	397 (117.7)	411.4 (109.6)	14.4	0.419
Fluid and electrolyte alteration (Sodium. Potassium. Calcium. Acid-base alteration)	10 (2)	345.9 (128.2)	411.5 (109.6)	65.6	0.109
HIV infection	2 (0)	505.5 (125.2)	409.7 (110.2)	95.8	0.221
AIDS	0 (0)	0 (0)	0 (0)	0	0
Tuberculosis	19 (4)	446.8 (108.5)	408.7 (110.2)	38.2	0.139
Any solid tumor without metastasis	87 (18)	397.4 (117.3)	412.9 (108.6)	15.4	0.237
Metastatic cancer	17 (3)	394.8 (95.1)	410.7 (110.8)	15.9	0.56
Leukemia	6 (1)	356.8 (88.8)	410.8 (110.4)	54	0.141
Lymphoma	4 (1)	525.6 (84.2)	409.2 (110)	116.4	0.006
Alcoholism	7 (1)	417.5 (87.1)	410 (110.6)	7.5	0.822
Schizophrenia or Bipolar Affective Disorder	5 (1)	343.2 (118.3)	410.8 (110.1)	67.6	0.173
Drug and psychoactive substance abuse	0 (0)	0 (0)	0 (0)	0	0
Depression	19 (4)	425.7 (98.7)	409.5 (110.7)	16.2	0.53

* Statistical significance <0.05

kidney disease with renal replacement therapy. the spearman correlation coefficient between distance walked and Charlson was -0.343 (95% CI: -0.420 -0.264) (p <0.001) and -0.213 (95% CI: - 0.285 -0.116) (p <0.001) with the Elixhauser index.



Discussion

The results of this study show a correlation in the reduction of meters walked in the 6-minute walk. according to the diseases evaluated in the Charlson and Elixhauser comorbidity indices. finding a greater relationship in those who presented cardiopulmonary pathologies such as chronic heart failure. arrhythmia heart disease. arterial hypertension. pulmonary hypertension. COPD. and other pathologies such as end-stage chronic kidney disease. the presence of lymphoma and dementia of any etiology.

The correlation found with the total scores and the distance in meters of the 6-minute walk is low. however. when cardiopulmonary pathologies are analyzed. this correlation increases. and may be useful in evaluating the disease or the response to treatment; It has been seen that in patients with heart failure and left ventricular dysfunction. the distance traveled in the 6-minute walk is lower. especially in patients who had a NYHA stage III and IV functional class where readmission to the service was also greater. long-term hospitalization and mortality [5.12]. Similarly. in COPD patients. C6M is useful in their follow-up. a FEV1 lower than 50% or a decrease in the distance traveled are a predictor of mortality [13]. An increase in the meters walked in patients with left ventricular dysfunction and COPD may be an indicator of a good response to pharmacological treatment. such as captopril and inhaled corticosteroid [14.15]. In the same sense. patients who traveled a distance greater than 288 meters with implantation of devices such as the ICD have a lower risk of mortality [16].

In patients with pulmonary hypertension. it has been found that a reduction in saturation during the 6-minute walk leads to a 26% increase in mortality. as well as a reduction in the distance walked when it is less than 300 m [17].

Pajek M and Cols. found that the presence of chronic kidney disease in hemodialysis was a negative predictor in the result of the C6M test. finding a reduction of 101 meters compared to the control group. suggesting that the factors that may influence the tests in these patients are fat body mass and total serum iron binding capacity. which may be associated with a decrease in functional reserve in subjects with this pathology [18]. Kohl LdeM in a prospective study with 52 patients with chronic kidney disease on hemodialysis and a mean follow-up of 144 months. found that an increase in the distance traveled of 100 meters in the C6M increases survival by 5%. in this study subjects were excluded with a history of smoking. COPD. AMI and stroke. which are known factors that have a direct impact on the reduction of the meters walked. In addition. a correlation was found between the results of the C6M and peak oxygen consumption. which allows suggesting that the C6M could be an additional tool in the functional evaluation in patients with non-cardiopulmonary pathologies [19].

Patients with other pathologies. such as lymphomas. present a significant reduction in the distance walked in the 6-minute test. which could be influenced by the level of severe physical deconditioning that these patients present. as well as the associated effects to chemo and radiotherapy [20]. However. to date there are no studies in patients with lymphoma or a history of it. which show an increase in mortality associated with a shorter distance walked in the 6-minute test. Diabetes also has a significant influence on reducing the distance traveled. In comparison studies between healthy patients and subjects with diabetes and diabetes with target organ involvement. a total decrease in walking distance of 64 m and 84 m was observed in diabetics with complications. this reduction of 20 m among patients with complicated diabetes and uncomplicated could be associated with a higher frequency of early cardiovascular disease or deconditioning. secondary to compromised target organ damage [21.22].

Among the weaknesses of our study is its retrospective nature. where there may be information biases with the use of prior medical history. however. there are a good number of subjects with complete and reliable information. the results of medium and long-term mortality situation that can be explored in future research. no cost data were obtained for the use of the C6M in the evaluation of patients. however the test is simple and widely available. to complement future research is could evaluate the measurement of the impact of physical rehabilitation processes in subjects with and without cardiopulmonary pathology. where C6M can be an additional objective tool in the evaluation. follow-up and therapeutic response of these patients.

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