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ORIGINAL RESEARCH

Factors associated with functional capacity of elderly registered in the Family Health Strategy

Fatores associados à capacidade funcional de idosos cadastrados na Estratégia Saúde da Família

Factores asociados a la capacidad funcional de ancianos registrados en la Estrategia Salud de la Familia

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ABSTRACT | The objective of this study was to verify the level of functional capacity in subjects aged 60 years or older from the Family Health Strategy "Vila São Paulo", in Bauru, São Paulo State, Brazil, and its association with the sociodemographic, behavioral, ergonomic, and referred health variables. A cross-sectional study was conducted on 363 elderly selected by the two-stage cluster technique, who were interviewed at home using the multidimensional instrument (sociodemographic, behavioral, ergonomic, referred health information), the Nordic questionnaire, and Katz and Lawton scales. Descriptive, bivariate, and multivariate analyses by logistic regression were used. Results showed that 36.9% of elderly were dependent on daily life activities, whereas 51.0% were on instrumental daily life activities. It also indicated that functional disability in daily life activities was associated with age range, repetitive movements, sedentary lifestyle, number of diseases, and musculoskeletal pain, while years of study, repetitive movements, number of diseases and physical inactivity showed an association with decreased instrumental daily life activities. The identified characteristics that are related to disability for daily life activities and instrumental daily life activities suggest a complex causal network; therefore, preventive actions directed specifically to some factors are needed, providing benefits to the quality of life of elderly.

Keywords | Aging; Health of the Elderly; Risk Factors.

RESUMO | O objetivo deste estudo foi verificar o nível de capacidade funcional em indivíduos de 60 anos ou mais da Estratégia Saúde da Família "Vila São Paulo", em Bauru, São Paulo, e sua associação com as variáveis sociodemográficas, comportamentais, ergonômicas e de saúde referidas. Realizou-se um estudo transversal com 363 idosos amostrados no local da análise, pela técnica de conglomerado em dois estágios, entrevistados nos domicílios pelo instrumento multidimensional (sóciodemográficos, comportamentais, ergonômicas e de saúde referida); pelo questionário Nórdico e pelas escalas de Katz e Lawton. Análises descritiva, bivariada e multivariada por regressão logística foram utilizadas. Notou-se que 36,9% dos idosos eram dependentes nas atividades de vida diária e 51,0% nas atividades instrumentais de vida diária; a incapacidade funcional para as atividades de vida diária foi associada à faixa etária, aos movimentos repetitivos, ao sedentarismo, ao número de doenças referidas e à dor musculoesquelética, enquanto que anos de estudo, movimentos repetitivos, número de doenças referidas e sedentarismo mostraram associação com a diminuição das atividades instrumentais de vida diária. As características identificadas que se relacionaram à incapacidade para as atividades de vida diária e instrumentais de vida diária sugerem uma complexa rede causal, sendo necessárias ações preventivas especificamente voltadas para certos fatores, propiciando benefícios à qualidade de vida dos idosos.

Descritores | Envelhecimento; Saúde do Idoso; Fatores de Risco.

Study conducted at the Family Health Strategy of "Vila São Paulo" and *Universidade do Sagrado Coração de Bauru* (USC) – Bauru (SP), Brazil.
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RESUMEN | El objetivo del estudio fue verificar lo nivel de la capacidad funcional en sujetos con 60 años o más pertenecientes a la Estrategia Salud de la Familia "Vila São Paulo", en Bauru, San Pablo, Brasil, y su asociación con variables sociodemográficas, comportamentales, ergonómicas y de salud referida. Se realizó un estudio trasversal con 363 ancianos muestreados en la región del análisis por la técnica de conglomerado en dos estadios, entrevistados en sus casas utilizándose el instrumento multidimensional (sociodemográficas, comportamentales, ergonómicas y de salud referida); el cuestionario nórdico y las escalas de Katz y Lawton. Fueron aplicadas las evaluaciones descriptiva, bivariada y multivariada por regresión logística. Se observó que un 36,9% de los ancianos dependían de actividades de vida diaria y un 51,0% de actividades instrumentales de vida diaria; la incapacidad funcional para actividades de vida diaria fue asociada a la edad, a los movimientos repetitivos, al sedentarismo, al número de enfermedades mencionadas y al dolor musculoesquelético, mientras que los años de escolaridad, los movimientos repetitivos, el número de enfermedades mencionadas y el sedentarismo mostraron asociación con diminución de las actividades instrumentales de vida diaria. Las características identificadas que se asociaran a la incapacidad para actividades de vida diaria e instrumentales de vida diaria sugieren una compleja red causal, con la necesidad de acciones preventivas direccionadas para algunos factores, promoviendo beneficios a la cualidad de vida de los ancianos.

Palabras clave | Envejecimiento; Salud del Anciano; Factores de Riesgo.

INTRODUCTION

Aging is a natural process that affects the physical and cognitive aspects, triggering dependence in basic and instrumental activities such as leaving home, bathe, urinate, among others[1].

The functional capacity (FC) refers to the potential to perform activities of daily living or a particular act without help[2], essential for a better quality of life[3]. The Katz's scale for activities of daily living (ADL) and the Lawton's to instrumental activities of daily living (IADL) are measures commonly used to assess the individual FC.

Studies show that older age, female sex, marital status (widow), low economic status, low education level, physical inactivity, harmed balance and mobility, depression and cognitive impairment are related to the daily living and instrumental disabilities[1,4-7].

The evaluation of the FC is relevant in Gerontology as an indicator of the quality of life of the elderly, and the performance of ADLs is considered a parameter used by health professionals to assess varying degrees of dependence of individuals[8]. Through evaluation of FC, you can program a data collection so that managers of the Unified Health System could promote local health actions policies aimed at maintaining the FC, the current guidelines of the National Health Policy for the Elderly[9].

Thus, this study aimed to determine the level of FC in individuals of 60 years or older and its association with sociodemographic, behavioral, ergonomic and referred to health variables.

METHODOLOGY

Cross-sectional study with individuals of 60 years or older in the areas restricted to the Family Health Strategy (FHS) in North region of Bauru, in São Paulo State, Brazil, with two teams. This unit was chosen because it is the Universidade Sagrado Coração (USC) place for primary care. The study was approved by the Ethics in Research Committee of the USC (238/11).

The population over 60 years registered in FHS is 643 individuals. The sample size was calculated from the population (643), the estimated prevalence of 29% of low FC of the sampling error of 3% and the 95% confidence level[10].

A sample was used by clusters in two stages. In the first, the Family Health Units were selected as basic selection. There, was held the proportional stratified sampling to the amount of elderly enrolled for coverage area of each community worker and sex. In the second, the elderly was considered the sample unit, randomly chosen from the register of families served by the agent.

The interviews were conducted in the homes of the selected elderly, have been excluded persons unable to complete the questionnaire. When the resident was not present, after three attempts or response impossibility, it was randomly selected another elderly. The supervisor made the quality control, which consisted of questionnaires with limited number of questions to 10% of respondents.

A pre-coded questionnaire containing demographic (gender, age, marital status and skin color), socioeconomic (education and income), behavioral (physical activity and smoking), ergonomic (work sitting, standing, squatting, lying, kneeling, vibration and/or shake, weight bearing,

repetitive motion), musculoskeletal pain and morbidity variables was used. All of them were considered independent.

The smoking variable was collected in the categories of non-smokers, ex-smokers (stopped for more than six months) or current smoker (one or more cigarettes a day for over a month). The level of physical activity was assessed by the International Physical Activity Questionnaire (IPAQ)[11].

The reported diseases were documented through interviews, in which the subject chose among the alternatives: hypertension, osteoporosis, diabetes, osteoarthritis, skin diseases, gastrointestinal, respiratory, pancreas or liver, genital and urinary system, like the one(s) that correspond(s) to diagnosis it has received from a doctor in the last 12 months. Musculoskeletal pain was reported by the Nordic questionnaire[12].

The dependent variable (FC) was declared by the scales of Katz[13] and Lawton[14]. It was decided for these instruments due to its wide use in research and recognition for the functional evaluation of the elderly[10].

For data analysis, it was used the Statistical Package for Social Sciences (SPSS), version 10.0 (SPSS Inc., Chicago, USA). Absolute and relative frequencies distributions were made for categorical variables and the bivariate analysis using the Pearson correlation coefficient. Multivariate analysis was performed by binary regression logistic, following the hierarchical model, introducing the variables in block form, remaining in subsequent model only those that had statistical significance ($p<0.05$) in the previous. The exit criteria for each was set at $p<0.10$. In the end, it was reached a final regression model with only the variables with greater statistical significance. The method used was backward stepwise. It was considered a significance level of 5% and a confidence interval of 95% (95%CI), with calculation of adjusted Odds Ratios[15].

RESULTS

In this paper, 363 elderly subjects were studied, considering 3.2% of refusals and 1.2% of exclusions, a mean age of 70.04 (±7.89) years. In Table 1 it can be noticed that, in both sexes, there are concentrations in the age group 60–69 years, married elderly, white, with three to four years of study, earning two to five minimum wages and up to two diseases and sedentary.

With regard to the elderly ability to run ADL, it was observed that 36.9% were dependent and 63.1% independent; while for IADL, 51.0% were dependent and 49% independent.

In Table 2 it can be observed a significant relation of the ADL with age, sex, race, years of education, related diseases, physical inactivity and musculoskeletal pain and the IADL were associated with age, the years of study, the reported diseases, sedentary lifestyle and to musculoskeletal pain.

The ADLs (Table 3) were associated with repetitive movements, transportation and bearing of weight, sitting and sitting tilting the body positions. But the IADLs were related to repetitive movements, kneeling and sitting lifting weight positions.

In Table 4 it is shown the combination of ADL with repetitive movements, sedentary lifestyle, related diseases and musculoskeletal pain and, in Table 5, years of study, repetitive movements, related diseases and physical inactivity were associated with the decline in IADL.

Table 1. Distribution of frequencies of the elderly according to sociodemographic variables, related diseases and physical activity of the elderly

Factor	Sex	
	Male n (%)	Female n (%)
Age		
60-69	116 (54.5)	80 (53.3)
70-79	72 (33.8)	54 (36.0)
>80	25 (11.7)	16 (10.7)
Marital status		
Married	94 (44.1)	116 (77.3)
Widower	89 (41.8)	10 (6.7)
Single	10 (4.7)	5 (3.3)
Separate	20 (9.4%)	19 (12.7)
Race		
White	106 (49.8)	65 (43.3)
Black	30 (14.1)	24 (16.0)
Brown/mulatto	77 (36.2)	61 (40.7)
Years of schooling		
1	90 (47.0)	36 (33.3)
2	20 (9.4)	20 (13.3)
3 to 4	66 (31.0)	55 (36.7)
5 to 8	27 (12.7)	25 (16.7)
Income		
Up to 1 MW	71 (33.3)	35 (23.3)
From 2 to 5 MW	142 (66.7)	115 (76.7)
Related diseases		
Up to 2	116 (54.5)	87 (58.0)
3 or more	97 (45.5)	63 (42.0)
Physical activities		
Sedentary	181 (85.0)	99 (66.0)
Active	32 (15.0)	51 (34.0)

MW: minimum wage

Tabela 2. Bivariate analysis among sociodemographic characteristics, related diseases and the level of physical activity, activities of daily living and instrumental daily life in elderly

Factors	ADL			IADL		
	D n (%)	I n (%)	χ^2 and p-values	D n (%)	I n (%)	χ^2 and p-values
Age (years)						
60 to 69	63 (47.0)	133 (58.1)	4.166	91 (49.2%)	105 (59.0)	3.507
70 or more	71 (53.0)	96 (41.9)	0.02	94 (50.8%)	73 (41.0)	0.03
Sex						
Female	45 (33.6)	105 (45.9)	5.248	73 (39.5)	77 (43.3)	0.540
Male	8 (66.4)	124 (54.1)	0.01	112 (60.5)	101 (56.7)	0.26
Race						
White	66 (49.3)	105 (45.9)	0.393	87 (47.0)	84 (47.2)	0.935
Black/Mulatto	68(50.7)	124 (54.1)	0.30	98 (53.0)	94 (52.8)	0.54
Marital status						
Married	75 (56.0)	135 (59.0)	0.308	103 (53.7)	107 (60.1)	0.732
Widowed, single, separated	59 (44.0)	94 (41.0)	0.32	82 (44.3)	71 (39.9)	0.22
Years os schooling						
0 to 4 years	78 (58.2)	112 (48.9)	2.931	119 (64.3)	71 (39.9)	21.716
5 to 8 years	56 (41.8)	117 (51.1)	0.05	66 (35.7)	107 (60.1)	0.0001
Income in minimum wage						
Up to 1	43 (32.1)	63 (27.5)	0.857	55 (29.7)	51 (28.7)	0.061
From 2 to 5	91 (67.9)	166 (72.5)	0.21	130 (70.3)	127 (71.3)	0.45
Related disease						
Up to 2	47 (35.1)	6 (49.8)	9.492	77 (41.6)	126 (70.8)	31.304
3 or more	45 (33.6)	115 (50.2)	0.001	108(58.4)	52 (29.2)	0.0001
Physical activity level						
Sedentary	122 (91.0)	158 (69.0)	24.838	160 (86.5)	120 (67.4)	19.872
Active	12 (8.9)	71 (31.0)	0.0001	25(13.5)	58 (32.6)	0.0001
Pain						
Up to 2 places	62 (46.3)	141 (61.6)	8.032	93 (50.3)	110 (61.8)	4.890
3 or more places	72 (53.7)	88 (38.4)	0.003	92 (49.7)	68 (38.2)	0.01

ADL: activities of daily living; IADL: instrumental activities of daily living; D: dependent; I: independent

Table 3. Bivariate analysis of the variables related to the work and activities of daily living and instrumental daily life in elderly

Factors	ADL			IADL		
	D n (%)	I n (%)	χ^2 and p-values	D n (%)	I n (%)	χ^2 and p-values
Repetitive movements						
Never/rarely	53 (39.6)	11 (4.8)	4.166	23 (12.4)	41 (23.0)	3.507
Usually/always	81 (60.4)	218 (95.2)	0.02	162 (87.6)	137 (77.0)	0.03
Vibration						
Never/rarely	79 (59.0)	129 (56.3)	0.238	107 (57.8)	101 (56.7)	0.045
Usually/always	55 (41.0)	100 (43.7)	0.35	78 (42.2)	77 (43.3)	0.45
Weight transportation and bearing						
Never/rarely	37 (27.6)	88 (38.4)	4.380	59 (31.9)	66 (37.1)	1.108
Usually/always	97 (72.4)	141 (61.6)	0.02	126 (68.1)	112 (62.9)	0.17
Kneeling position						
Never/rarely	65 (48.5)	101 (44.1)	0.666	75 (40.5)	91 (51.1)	4.094
Usually/always	69 (51.5)	128 (55.9)	0.24	110 (59.5)	87 (48.9)	0.02
Sitting position						
Never/rarely	105 (78.4)	148 (64.6)	7.545	124 (67.0)	129 (72.5)	1.273
Usually/always	29 (21.6)	81 (35.4)	0.004	61 (33.0)	49 (27.5)	0.15
Sitting lifting weight						
Never/rarely	120 (89.6)	191 (83.4)	2.602	152 (82.2)	159 (89.3)	3.793
Usually/always	14 (10.4)	38 (16.6)	0.07	33 (17.8)	19 (10.7)	0.03
Sitting tilting the body						
Never/rarely	100 (74.6)	135 (59.0)	9.099	115 (62.2)	120 (67.4)	1.097
Usually/always	34 (25.4)	94 (41.0)	0.002	70 (37.8)	58 (32.6)	0.17
Standing position						
Never/rarely	5 (3.7)	17 (7.4)	2.024	12 (6.5)	10 (5.6)	0.120
Usually/always	129 (96.3)	212 (92.6)	0.11	173 (93.5)	168 (94.4)	0.45
Standing position tilting the body						
Never/rarely	12 (9.0)	21 (9.2)	0.005	16 (8.6)	17 (9.6)	0.089
Usually/always	122 (91.0)	208 (90.8)	0.55	169 (91.4)	161 (90.4)	0.45

ADL: activities of daily living; IADL: instrumental activities of daily living; D: dependent; I: independent

Table 4. Multivariate analysis of logistic regression for independent associations with activities of daily living

Factor	p-value	Adjusted OR* / 95%CI
Age group		
60 to 69 years	0.02	1.00
70 years or more		1.85 (1.08-3.12)
Repetitive movements		
Never/rarely	0.0001	1.00
Usually/always		10.8 (6.27-30.55)
Related diseases		
Up to 2	0.008	1.00
3 or more		2.09 (1.21-3.62)
Level of physical activity		
Active	0.001	1.00
Sedentary		3.89 (2.03-7.39)
Pain		
Within 2 regions	0.006	1.00
3 or more regions		2.12 (1.23-3.70)

*adjusted by sex. education. income and instrumental activity of daily living; OR: *Odds Ratio*; CI: confidence interval

Table 5. Multivariate analysis of logistic regression for independent associations with instrumental activities of daily living

Factor	p-value	Adjusted OR* / 95%CI
Years of schooling		
5 to 8	0.001	1.00
0 to 4		3.12 (1.92-5.26)
Repetitive movements		
Never/rarely	0.006	1.00
Usually/always		2.80 (1.45-5.32)
Related diseases		
Up to 2	0.0001	1.00
3 or more		3.83 (2.35-6.24)
Level of physical activity		
Active	0.0001	1.00
Sedentary		3.25 (2.03-5.19)

*adjusted by sex. education. income and instrumental activity of daily living; OR: *Odds Ratio*; CI: confidence interval

DISCUSSION

In this study, it was observed a higher frequency of elderly people, of both sexes, aged between 60 and 69 years and with an income of two to five minimum wages, married and with up to four years of study, corroborating with other studies[5,16,17].

Of the elderly analyzed, 36.9% were dependent in ADLs, coinciding with the data from Goiania[4], Goiás State, Brazil, while in Pelotas[1], Rio Grande do Sul State, Brazil, the percentages were lower. Regarding the AIVD, 51% of the participants were dependent, while in Pelotas[1] there were 28% and in Goiania[4], 72.6%.

The prevalence of ADL was 10.8 times higher in subjects who carried out occupational activities requiring repetitive motion. The labor risk factors result in degeneration of muscle fibers and reduction in nerve conduction, with consequences on limiting the range of motion, muscle strength and impaired sensory perception, which contributes to the reduction of the individual FC with aging[18].

Elderly people who reported more than one disease had about twice more chances to functional incapacity for ADL and IADL 38% more, similar to Spanish[6], Dutch[19] and Mexicans[20]. The morbidities decisively compromise the autonomy and the FC problems, and may be a high risk to the health of this population and thus favoring the development of disability, which contribute to decrease the longevity[21].

The elderly who reported more musculoskeletal pain had higher dependence to perform ADL, fact similar to the findings seen in Mexico[20] and in Jequié[22], Bahia State, Brazil. The pain has a negative impact on the functionality, favors the reduction of joint motion and muscle weakness arcs, lowering levels of physical activity and thus the quality of life[23,24].

Sedentary elderly had 38 and 32% more chances of disability for ADL and IADL, respectively, confirming the studies performed in São Paulo[24], São Paulo State, Brazil, and Guatambu[25], Santa Catarina State, Brazil. Regular physical activity has been considered protective of limitations, also demonstrating a better benefit in relation to the physical capacity at more advanced ages[25].

In this study, the older elderly were 18% more likely to have a decrease in ADL, which was confirmed by studies in England[5], Malaysia[7], Mexico[20], Jequié[22], Japan[26] and the United States[27]. As occurs the advancing of age, the physical and organic limitations lead to repercussions on the physical, intellectual and social functions, compromising the ADL and IADL[1,28].

The prevalence of IADL was 3.12 times higher in the elderly with up to four years of education, confirmed by other studies[1,7,10,17]. The low educational level limits the understanding of the information received by health professionals and through other means, interfering with the self-care ability and adherence to interventions, and access to health services because of the relation between low education and income[3].

The main limitations of this study were: the measures were based on self-reports of a part of town and do not represent all the elderly; the data source was the data of the health unit and not the households; has not been assigned a cognition test as means of inclusion criteria, such as *Minimental*; was not used the model proposed by the World Health Organization, which is the psychosocial approach; because it is a cross-section analysis, it is not possible to demonstrate causality.

A favorable point of this research was the use of validated questionnaires for the Brazilian population, and to

have been collected data from circumscribed elderly in the same geographical region and characterized by the level of income with no significant difference.

CONCLUSION

The results showed that 36.9% of the elderly were classified as dependent in ADLs and 51% in IADL and that the main factors associated with ADL were age, repetitive movements, sedentary lifestyle, related diseases and musculoskeletal pain, while years of schooling, repetitive movements, related diseases and physical inactivity were associated with the decline in IADL.

This study reinforces the importance of strategies for maintaining health and a disability-free life. In this sense, physical therapy has a central role, since it is their professional practice to organize and execute individual and collective activities of health promotion and prevention of morbidity in all levels of health.

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