Tehran University of Medical Sciences

Nursing Practice Today

2023; Volume 10, No 4, pp. 356-363

Original Article

Functional capacity and its associated factors in older adults in the rural area in Brazil

Eveline Fontes Costa Lima[1], Ezequiel Oliveira da Silva[2], Jack Roberto Silva Fhon[1]*

[1]School of Nursing, University of São Paulo, São Paulo, Brazil
[2]Hospital Japonês Santa Cruz, São Paulo, Brazil

ARTICLE INFO

Received 11 August 2023
Accepted 22 October 2023

Available online at:
http://npt.tums.ac.ir

Keywords:
functional capacity;
activities of daily living;
aged;
rural population

***Corresponding Author:**
Jack Roberto Silva Fhon, School of Nursing, University of São Paulo, São Paulo, Brazil.
E-mail: betofhon@usp.br

DOI:
10.18502/npt.v10i4.14081

ABSTRACT

Background & Aim: Aging leads to bodily changes and impairment of functional capacity in older adults. The objective was to analyze the association between socio-demographic and health data, cognitive impairment, and risk of sarcopenia with functional capacity in older adults enrolled in the Family Health Strategies in the rural area of the municipality of Picos, Piauí, Brazil.

Methods & Materials: This is a quantitative and cross-sectional study that was developed with 320 older adults attending the Family Health Strategies located in the rural area of Picos, Piauí, Brazil. The participants were people 60 years old, registered in the Family Health Strategies, and living in a rural area. Data was collected in the older adults' homes using the following instruments: Demographic profile, Self-reported illnesses, Mini-Mental State Examination, Barthel Index, Lawton and Brody Scale, and SARC-F.

Results: It was found that 70% had cognitive impairment, 53.8% were at risk of sarcopenia, with a mean of 93.72 (SD=11.84) points for basic activities daily living, and 77.8% with partial dependence for instrumental activities daily living with a mean of 16.79 (SD=3.79) points. In the multivariate multiple regression, it was identified that there was an association between Basic Activities of Daily Living and Instrumental Activities of Daily Living with age ($p<0.001$), number of children ($p=0,025$), education ($p=0.003$), monthly income ($p=0.018$), number of diseases ($p<0.001$), sarcopenia ($p<0.001$) and cognitive status ($p<0.001$).

Conclusion: A high prevalence of functional disability was identified in elderly people living in the rural area of Picos, Piauí, Brazil. Therefore, it is important to pay attention to factors associated with dependence on daily activities.

Introduction

Healthcare for older adults should be continuous and constant, especially for those who live in rural areas due to their vulnerabilities (1). The population residing in rural areas has reduced access to health information (2), with older adults being susceptible to different syndromes such as frailty (1), cognitive impairment (3), falls, fractures, sarcopenia (4), and some degree of functional dependence (5).

According to the World Health Organization (WHO), functional capacity is defined as the set of health characteristics that individuals have that can enable them to be or do what they enjoy (6). In this regard, evaluating the dependency levels of the older adult population provides knowledge about functional capacity indices, thus contributing to appropriate interventions to prevent disabilities in this vulnerable population (7). A decrease in functional capacity is observed with advancing age, which is related to the performance of older adults in performing Basic Activities of Daily Living (BADL) and Instrumental Activities of Daily Living (IADL) (7,8,9). The first consists of performing acts that enable self-care, such as bathing, dressing, and eating (8). The second refers to the ability to shop, handle the phone, and perform household chores (among other tasks) (9).

An international study carried out with 31.464 older adults from urban and rural communities in India with the objective of evaluating the prevalence and determinants of

Please cite this article as: Lima E.F.C, Silva E.O, Fhon J.R.S. Functional capacity and its associated factors in older adults in the rural area in Brazil. Nursing Practice Today. 2023; 10(4):356-363

BADL and IADL identified that older adults living in rural areas had 3.3% severe disability, 20% moderate disability, 76.7% no disability in BADL; and 6.8% severe disability, 44.8% moderate disability, 44.8% no disability in IADL. In this study, disability was associated, among other variables, with female sex, advanced age, and higher education (5).

On the other hand, a national study with 1,029 older adults in a rural area of Rio Grande do Sul estimated a functional dependence prevalence of 8.1% in BADL and 32.4% in IADL. The occurrence of functional dependence in one or more BADL or IADL was 6.7%. Dependence is associated with advanced age, education, female sex, diabetes mellitus, urinary incontinence, depression, stroke, and poor self-rated health (10).

In addition, another study carried out with older adults in the urban area of Cameroon identified that dependence on daily activities was associated with male sex, age over 75 years, osteoarthritis, and polypharmacy; sarcopenia was associated with female gender and SARC-F score≥4; and cognitive impairment was associated with education (11). However, it did not evaluate the relationship between the three geriatric syndromes.

The present study is justified because it is extremely important to investigate the functioning of the elderly population living in rural areas and its association with cognitive impairment and sarcopenia to contribute to filling the gap in the lack of studies carried out with elderly people in rural areas, mainly in the Brazilian Northeast. Thus, this study aimed to analyze the association between socio-demographic and health data, cognitive deficit, and risk of sarcopenia with functional capacity in elderly people registered in Family Health Strategy units in the rural area of the municipality of Picos, Piauí, Brazil.

Methods

This is a quantitative, observational, cross-sectional study developed with older adults attended by the 11 Family Health Strategy (*Estratégias da Saúde da Família - ESF*) units located in the rural area of Picos, Piauí, Brazil. These locations are far from the urban center, where there is greater accessibility to health, commercial, and banking services. To write the manuscript, the STROBE guide was used (12).

The study population consisted of the total number of older adults (n=3.111) registered in the *ESF* in the rural area, according to the Municipal Health Secretariat (*Secretaria Municipal de Saúde - SMS*). The sample size calculation is considered an *a priori* determination coefficient. $R^2 = 0.1$, in a linear regression model with seven predictors, with a significance level or type I error of $\alpha = 0.01$ and type II error of $\beta = 0.1$, therefore resulting in an *a* priori statistical power of 90%.

Next, a minimum sample size of 228 participants was obtained using the Power Analysis and Sample Size version 13 application. Considering a sampling loss of 20%, the maximum number of recruitment attempts was 285. The main outcome variables were BADL and IADL. It was subsequently decided to conduct 320 interviews to avoid possible losses and because of the availability of time and resources.

The participants were chosen at random through lists containing names, addresses, and telephone numbers of the registered older adults, as provided by the nurses of each *ESF*, as well as the details of the micro areas to which they belonged under the coverage of the respective Community Health Agents (*Agentes Comunitários de Saúde - ACS*).

The random selection was made by drawing lots using the IBM Statistical Package for the Social Sciences v. 25.0 program, where the number of elderly people drawn was proportional to the number of elderly people registered in each ESF unit, thus obtaining a representative sample of the population.

The following inclusion criteria were used to select participants for the study: being 60 years old or older of both sexes, being registered in the *ESF* selected for this study, and living in a rural area. The following exclusion criteria were used: difficulty in verbalizing responses, answering the instrument's questions, or not assisting the researcher in scheduled visits on up to three occasions. Elderly people with cognitive impairment were not excluded. The researcher completed the questionnaires through interviews with the elderly, with occasional assistance from family members.

Data collection was conducted from June to August 2022 with prior telephone scheduling, and home visits were carried out by the researcher in charge with help from the *ACS* of each *ESF*. The interviews lasted approximately 50 minutes, and the following instruments were used:

Socio-demographic profile questionnaire: information such as sex (male and female), age (in years), marital status (with or without a partner), number of children, retirement (is retired or is not), monthly income (in reais) and formal schooling (in years).

Anthropometric Measurements Questionnaire: height (in centimeters), weight (in kilograms), waist circumference (in centimeters), hip (in centimeters), and calf (in centimeters) were measured, and the Body Mass Index (BMI) was subsequently calculated.

Health Problems Questionnaire: questions were asked about self-reported chronic diseases.

Mini-Mental State Examination (MMSE): this instrument is translated and validated for Brazil; the instrument has good applicability in population, outpatient, and hospital studies. It has a score of 0 to 30 points and consists of items that consider temporal orientation (5 points), spatial orientation (5 points), word registration (3 points), attention and calculation (5 points), word recall memory (3 points), language (2 points), phrase repetition (1 point), written command reproduction (1 point), command execution (3 points), sentence writing (1 point), and drawing reproduction (1 point) (13).

The test score and the older adult's education were evaluated to categorize them as either having or not having cognitive impairment using the following cut-off points: 20 for illiterates, 25 for 1 to 4 years, 26.5 for 5 to 8 years, from 28 to 9 to 11 years old and from 29 for those over 11 years old (13).

Barthel Index: Validated (Cronbach's alpha= 0,90) and translated into Brazilian Portuguese and evaluates making meals, bathing, dressing, grooming, evacuation, urination, going to the bathroom, transfers, walking, and going down or going upstairs. The instrument has a score that varies from 0 to 100 points, with a lower score referring to a higher level of dependence. There was no categorization of the elderly as dependent or not because the index does not cut off point to Brazil (14).

Lawton and Brody Scale: translated and validated for Brazil and assesses the ability of older adults in activities such as using the telephone, transportation, shopping, preparing food, doing household chores, and handling medication and money. It has a score ranging from 7 to 21 points, so the lower the score, the greater the dependence. In addition, the older adult can be classified as independent (=21), partially dependent (>7 <21), and dependent (≤7) (15).

SARC-F: Validated for Brazil and evaluates strength, gait speed, getting up from a chair, and climbing stairs. There is also an item regarding falls. In addition, the calf circumference is measured for females with the options> 33 cm (0 points) and ≤ 33 cm (10 points) and for males with the options > 34 cm (0 points) and ≤ 34 cm (10 points). Total points can range from 0 to 20, so a score between 11 and 20 points is suggestive of sarcopenia, with no confirmation of sarcopenia or high-risk detection (16).

The collected data were entered into Microsoft Excel® and analyzed using the IBM Statistical Package for the Social Sciences version 25.0 program. However, it was first identified that the data were normal before analyzing the information. A descriptive analysis was then performed, considering that simple frequencies and percentages were identified for categorical variables and dispersion measures such as mean, standard deviation (SD), and maximum and minimum values for numerical variables.

Crude multiple linear regression was performed as a final analysis with the Basic Activities of Daily Living and Instrumental Activities of Daily Living variables as the outcome, adjusted for sex and age. Multivariate multiple regression by Type II MANOVA Tests Pillai test statistic was used, considering BADL and IADL as outcomes. All statistical tests had a statistical significance of $p<0.05$.

This project was approved by the Picos *SMS* and by the Ethics Committee (*CEP*) of the School of Nursing of the University of São Paulo

under number 5.326.336. The older adults who agreed to participate in this study signed the Informed Consent Form in two copies. There was no special ethical consideration for elderly people with cognitive impairment, and all consent forms were signed by them in the presence of family members.

Results

A total of 82.5% of the older adults interviewed were aged between 60 and 79, with an average of 71.92 (SD=8.07) years; 59.4% were female, 61.3% had a partner, an average of 4.27 (SD=2.76) children, and 93.8% were retired. In addition, they had a mean of 2.16 (SD=2.71) years of formal schooling and R$1,560.67 (SD=675.44) monthly income (Table 1).

Table 1. Socio-demographic characterization of older adults registered in the family health strategies in the rural area. Picos, PI, Brazil 2022

Variable		n (%)	Min	Max	Mean	SD
Age	60-79	264 (82.5)	60	100	71.92	8.07
	80 or older	56 (17.5)				
Sex	Female	190 (59.4)				
	Male	130 (40.6)				
Civil status	Have a companion	196 (61.3)				
	No companion	124 (38.8)				
Number of children			0	14	4.27	2.76
Retired	Yes	300 (93.8)				
	No	20 (6.3)				
Monthly income			600.00	7,000.00	1,560.7	675.44
Education			0	15	2.16	2.71

Minimum monthly salary: US$ 261.42

Among the health problems self-reported by the older adults, it is noteworthy that 72.2% (n=231) reported back problems, 65.9% (n=211) systemic arterial hypertension, 55.9% (n=179) anxiety, 55.3% (n=177) arthritis, 52.5% (n=168) impaired vision, 51.9% (n=166) insomnia, 37.5% (n=120) dizziness, 32.4% (n=104) gastrointestinal diseases, 30.9% (n=99) peripheral vascular disease, and reported an average of 6.54 (SD=3.15) health problems, ranging from 0 to 14.

Considering the clinical evaluation of the older adults, it was found that 70% had cognitive impairment with a mean of 20.99 (SD=4.25), 53.8% were at risk of sarcopenia with a mean of 10.23 (SD=5.03) points, a mean of 93.72 (SD=11.84) points for BADL, and 77.8% with partial dependence for IADL with mean of 16.79 (SD=3.79) points.

Most of the older adults were independent in performing BADL. However, 8.1% were dependent on going up and down stairs, 3.8% on taking a shower, and 2.5% on getting dressed and going to the bathroom, respectively. In addition, most of the older adults were dependent on performing IADL or needed help using the telephone (32.2% and 18.1%), handling money (25.3% and 25 .6%), making purchases (22.5% and 34.1%) and using transportation (8.1% and 45.3%).

An association was identified in the BADL analysis with crude linear regression between age (p=0.009), education (p=0.001), number of diseases (p=0.001), sarcopenia (SARC-F score) (p<0.001), and cognitive status (p<0.001). On the other hand, an association in the linear regression adjusted for sex and age was identified with age (p=0.001), education (p=0.001), number of diseases (p=0.001), sarcopenia (SARC-F score) (p<0.001) and cognitive status (p<0.001) (Table 2).

In the IADL analysis in the crude linear regression, it was verified that there was an association with age (p<0.001), number of children (p=0.011), number of diseases (p<0.001), sarcopenia (SARC-F score) (p<0.001) and cognitive status (p<0.001). Moreover, there was an association in the multiple linear regression adjusted for sex and age with age (p<0.001), number of children (p=0.023), number of diseases (p<0.001),

sarcopenia (SARC-F score) (p<0.001) and cognitive status (p<001) (Table 3). In the multivariate multiple regression, it was identified that there was an association between BADL and IADL with age (p<0.001), number of children (p=0,025), education (p=0.003), monthly income (p=0.018), number of diseases (p<0.001), sarcopenia (p<0.001) and cognitive status (p<0.001) (Table 4).

Table 2. Crude multiple linear regression adjusted for age and sex according to factors associated with basic activities of daily living of older adults enrolled in the family health strategies in the rural area. Picos, PI, Brazil 2022

Variables	Crude analysis				Adjusted analysis (sex and age)			
	β	t	p-value	95%CI	B	t	p-value	95%CI
Age	-0.224	-2.645	0.009	-0.390 to -0.057	-0.267	-3.405	0.001	-0.422 to -0.113
Sex (ref.: Male)	1.360	1.048	0.296	-1.194 to 3.914	1.111	0.882	0.379	-1.368 to 3.590
Civil status (ref.: Have a companion)	-0.449	-0.343	0.732	-3.028 to 2.129				
Number of children	-0.225	-1.069	0.286	-0.639 to 0.189				
Education	-0.788	-3.211	0.001	-1.271 to -0.305	-0.844	-3.492	0.001	-1.319 to -0.368
Monthly income	-0.001	-1.683	0.093	-0.003 to 0.000				
Retired	-0.640	-0.276	0.782	-5.192 to 3.913				
Number of diseases	-0.701	-3.493	0.001	-1.095 to -0.306	-0.672	-3.466	0.001	-1.053 to -0.290
Sarcopenia (Total score)	-0.556	-4.283	<0.001	-0.812 to -0.301	-0.566	-4.745	<0.001	-0.801 to -0.331
Body Mass Index	0.022	0.160	0.873	-0.249 to 0.293				
Cognitive status (Total score)	1.070	6.533	<0.001	0.748 to 1.393	1.089	6.782	<0.001	0.773 to 1.404

Table 3. Crude multiple linear regression adjusted for age and sex according to factors associated with the instrumental activities of daily living of older adults enrolled in the family health strategies in the rural area. Picos, PI, Brazil, 2022

	Crude analysis				Adjusted analysis			
Variables	**B**	**t**	**p-value**	**95%CI**	**B**	**t**	**p-value**	**95%CI**
Age	-0.139	-6.277	<0.001	-0.183 to -0.095	-0.138	-6.542	<0.001	-0.179 to -0.096
Sex (ref.: Male)	-0.347	-1.020	0.309	-1.016 to 0.322	-0.395	-1.213	0.226	-1.036 to 0.246
Civil status (ref.: have a companion)	-0.453	-1.319	0.188	-1.129 to 0.223				
Number of children	-0.142	-2.570	0.011	-0.250 to -0.033	-0.122	-2.289	0.023	-0.227 to -0.017
Education	-0.025	-0.382	0.703	-0.151 to 0.102				
Monthly income	0.000	1.844	0.066	0.000 to 0.001				
Retired	-0.344	-0.567	0.571	-1.537 to 0.849				
Number of diseases	-0.196	-3.727	<0.001	-0.299 to -0.092	-0.201	-3.971	<0.001	-0.301 to -0.101
Sarcopenia (Total score)	-0.165	-4.842	<0.001	-0.232 to -0.098	-0.157	-5.026	<0.001	-0.219 to -0.096
Body Mass Index	-0.014	-0.388	0.698	-0.085 to 0.057				
Cognitive status (Total score)	0.324	7.544	<0.001	0.240 to 0.409	0.329	8.869	<0.001	0.256 to 0.402

Table 4. Multivariate multiple regression according to factors associated with the basic and instrumental activities of daily living of older adults enrolled in the family health strategies in the rural area. Picos, PI, Brazil, 2022

Variables	Pillaice test	F	P-value
Age	0.110	18.780	<0.001
Sex (ref.: Male)	0.011	1.635	0.197
Civil status (ref.: Have a companion)	0.007	1.032	0.357
Number of children	0.024	3.741	0.025
Education	0.037	5.826	0.003
Monthly income	0. 026	4.070	0.018
Retired	0.001	0.162	0.850
Number of diseases	0.059	9.575	<0.001
Sarcopenia (Total score)	0.096	16.104	<0.001
Body Mass Index	0.001	0.157	0.855
Cognitive status (Total score)	0.203	38.556	<0.001

Discussion

The study identified that there was an association between at least one of the daily activities, BADL and IADL, with age, number of children, education, monthly income, number of diseases, sarcopenia, and cognitive impairment. In multiple linear regression, there was an association with all of these variables except monthly income.

Studies have identified an important association between age and BADL and IADL in older adults (5, 17). With advancing age, some physiological changes occur related to the decline of the musculoskeletal system, including a decrease in muscle strength (18) and susceptibility to instabilities, especially for older adults with a history of falls (19). In addition to other factors, these alterations may be related to the increase in functional dependence in older adults, especially in relation to activities that involve displacement, such as going up and down stairs.

Furthermore, this study identified that education is associated with functional capacity of older adults, similar to other studies (5, 10). In this context, years of formal schooling are configured as a socioeconomic indicator that can be used to assess social inequalities, which can influence the performance of more menial jobs in the field and the greater execution of domestic services, requiring greater physical effort. However, a study identified that domestic activities may be associated with a greater chance of having muscle pain in the lower back, neck, shoulder, elbow, hands and wrists in Nigerian women living in rural areas (20).

Our study showed that the older adult population has a high average number of children, which was associated with greater dependence on IADLs.. This phenomenon can be explained by the fact that the more children, the older adult has, especially if linked to having a partner and grandchildren, the greater their support network, who may be performing the daily activities instead of the older adult, and this may be one of the reasons for the high percentage of dependent older adults in the sample. In this context, a study carried out in rural China identified that children and partners are the main components of the elderly support network (21).

Functional dependence was associated with the monthly income of the elderly. Thus, the low economic status of the study participants may have contributed to the greater physical effort through the performance of more domestic and daily agricultural activities throughout their lives, contributing favorably to muscle mass and functional capacity. A study showed that after 12 weeks of resistance training, elderly people showed hypertrophy in muscle fibers and increased strength; on the other hand, physical detraining resulted in a reduction of both (22). Therefore, physical exercise, as it contributes to increased muscle mass, is essential for healthy aging (23).

A high average of diseases was identified, which was associated with greater functional dependence in older adults for BADL and IADL, with emphasis on spinal problems that may have been caused as a result of manual work in agriculture. Studies have demonstrated the presence of morbidities and their association with functional capacity (10, 24).

In this context, a study carried out in the rural zone of Amazonas identified that chronic back pain had a lower chance of occurrence in older adults whose occupation was to be a civil servants, traders, or service providers compared to those who worked in agriculture (25).

Furthermore, the correct management of chronic musculoskeletal pain in the elderly must be carried out (26), which can influence the performance of daily activities. From this perspective, a randomized clinical trial found, among others, improvements in the intensity, level of disability and catastrophization of chronic low back pain after eight weeks of patient education interventions and motor control exercises in elderly people in rural Nigeria (27).

An association was identified between sarcopenia and BADL and IADL. Physiological changes occur in the musculoskeletal system with the aging process, such as a decrease in muscle quality, causing a reduction in muscle strength and physical performance (18). However, sarcopenia occurs when these characteristics become pathological by predefined parameters, resulting in negative outcomes (28).

The results found in this study refer to an association between cognitive impairment and BADL and IADL. Alterations in the cognitive status compromise domains such as attention and concentration, memory and learning, language, spatial orientation, and executive functions and social cognition (29), all of which may influence the performance of daily activities.

The method used for this study is among its limitations since a cross-sectional study makes it impossible to identify the causal relationships between the variables and the studied phenomenon, but it is emphasized that the information presented is important to identify the health status of older adults who live in rural areas. In addition, it will help health professionals to draw up collective and individual care plans for older adults.

Conclusion

A high prevalence of functional incapacity for BADL and IADL was identified in older adults living in the rural area of Picos, PI, Brazil. Variables like age, number of children, education, monthly income, number of diseases, risk of sarcopenia, and cognitive status were associated with IBADL or IADL.

Dependence in performing BADL and IADL in older adults is a situation that deals with difficulties, as the presence of family or formal caregivers may become necessary to assist or fully perform them, which may lead to overload or increased financial costs. Linked to this, living in rural areas causes more adversities in daily activities, mainly due to the distance to centers providing services, health, or other basic needs.

In view of this, the results are of great value to managers and health professionals who provide assistance to the older adult population in rural areas so that they can have a perspective of the health situation that they are in. Therefore, paying attention to factors associated with dependence on daily activities is important.

Acknowledgments

Our special gratitude goes to the elderly who agreed to participate in the research, the nurses, and the Community Health Agents of the Family Health Strategy of rural areas.

Conflict of interest

The researchers claim no conflicts of interest.

Funding statement

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES) – Finance Code 001.

References

1. Cooper F, Lewis EG, Urasa S, Whitton L, Collin H, Coles S, Wood GK, Ali AM, Mdegella D, Mkodo J, Zerd F. Social vulnerability, frailty, and their association with mortality in older adults living in rural Tanzania. The Journals of Gerontology: Series A. 2022 Oct 1;77(10):2050-8.
2. Chen X, Orom H, Hay JL, Waters EA, Schofield E, Li Y, Kiviniemi MT. Differences in rural and urban health information access and use. The Journal of Rural Health. 2019 Jun;35(3):405-17.
3. Borda MG, Venegas-Sanabria LC, Garcia-Cifuentes E, Gomez RC, Cano-Gutierrez CA, Tovar-Rios DA, Aarsland V, Khalifa K, Jaramillo-Jimenez A, Aarsland D, Soennesyn H. Body mass index, performance on activities of daily living and cognition: analysis in two different populations. BMC Geriatrics. 2021 Mar 12;21(1):177.
4. Wu X, Li X, Xu M, Zhang Z, He L, Li Y. Sarcopenia prevalence and associated factors among older Chinese population: Findings from the China Health and Retirement Longitudinal Study. PloS One. 2021 Mar 4;16(3):e0247617.
5. Chauhan S, Kumar S, Bharti R, Patel R. Prevalence and determinants of activity of daily living and instrumental activity of daily living among elderly in India. BMC Geriatr. 2022 Jan 19;22(1):64.
6. World Health Organization. Relatório mundial de envelhecimento e saúde. Geneva: WHO. 2015.
7. Tornero-Quiñones I, Sáez-Padilla J, Espina Díaz A, Abad Robles MT, Sierra Robles Á. Functional ability, frailty and risk of falls in the elderly: Relations with autonomy in daily living. International Journal of Environmental Research and Public Health. 2020 Feb;17(3):1006.
8. Mahoney FI, Barthel DW. Functional evaluation: The Barthel Index. A simple index of independence useful in scoring improvement in the rehabilitation of the chronically ill. Maryland State Medical Journal. 1965;14:56–61.
9. Lawton MP, Brody EM. Assessment of older people: self-maintaining and instrumental

activities of daily living. Gerontologist. 1969 Autumn;9(3):179-86.
10. Meucci RD, Aguiar de Oliveira ASL, Araújo GC, Gonzalez TN, Pagliaro G, Hoffmann T, Marmitt LP. Functional dependence among older adults: a cross-sectional study with a rural population of southern Brazil. Rural Remote Health. 2020 Oct;20(4):5985.
11. Essomba MJ, Atsa D, Noah DZ, Zingui-Ottou M, Paula G, Nkeck JR, Noubiap JJ, Ashuntantang G. Geriatric syndromes in an urban elderly population in Cameroon: a focus on disability, sarcopenia and cognitive impairment. Pan African Medical Journal. 2020 Nov 11;37(1):229.
12. Vandenbroucke JP, von Elm E, Altman DG, Gøtzsche PC, Mulrow CD, Pocock SJ, Poole C, Schlesselman JJ, Egger M; STROBE Initiative. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE): Explanation and elaboration. Epidemiology. 2007 Nov;18(6):805-35.
13. Brucki S, Nitrini R, Caramelli P, Bertolucci PH, Okamoto IH. Sugestões para o uso do mini-exame do estado mental no Brasil. Arquivos de Neuro-psiquiatria. 2003;61:777-81.
14. Minosso JS, Amendola F, Alvarenga MR, Oliveira MA. Validação, no Brasil, do Índice de Barthel em idosos atendidos em ambulatórios. Acta Paulista de Enfermagem. 2010;23:218-23.
15. dos Santos RL, Júnior JS. Confiabilidade da versão brasileira da escala de atividades instrumentais da vida diária. Revista Brasileira em Promoção da Saúde. 2008;21(4):290-6.
16. Barbosa-Silva TG, Menezes AM, Bielemann RM, Malmstrom TK, Gonzalez MC. Enhancing SARC-F: improving sarcopenia screening in the clinical practice. Journal of the American Medical Directors Association. 2016 Dec 1;17(12):1136-41.
17. Carmona-Torres JM, Rodríguez-Borrego MA, Laredo-Aguilera JA, López-Soto PJ, Santacruz-Salas E, Cobo-Cuenca AI. Disability for basic and instrumental activities of daily living in older individuals. Plos One. 2019 Jul 26;14(7):e0220157.
18. Shur NF, Creedon L, Skirrow S, Atherton PJ, MacDonald IA, Lund J, Greenhaff PL. Age-related changes in muscle architecture and metabolism in humans: The likely contribution of physical inactivity to age-related functional decline. Ageing Research Reviews. 2021 Jul 1;68:101344.
19. Thompson JD, Plummer P, Franz JR. Age and falls history effects on antagonist leg muscle coactivation during walking with balance perturbations. Clinical Biomechanics. 2018 Nov 1;59:94-100.
20. Osinuga A, Fethke NB, Story WT, Ibitoye SE, Baker KK. Assessing the relationship between domestic work experience and musculoskeletal health among rural Nigerian women. PloS One. 2022 Dec 13;17(12):e0276380.
21. Liu L, Yang Y, Zhao Y, Zhang T. Ethnic Differences in Social Support for Elderly Individuals in Rural Southern China: A Cross-sectional Survey. Asia Pacific Journal of Public Health. 2023 Jan;35(1):21-6.
22. Blocquiaux S, Gorski T, Van Roie E, Ramaekers M, Van Thienen R, Nielens H, Delecluse C, De Bock K, Thomis M. The effect of resistance training, detraining and retraining on muscle strength and power, myofibre size, satellite cells and myonuclei in older men. Experimental Gerontology. 2020 May 1;133:110860.
23. Distefano G, Goodpaster BH. Effects of exercise and aging on skeletal muscle. Cold Spring Harbor perspectives in medicine. 2018 Mar 1;8(3):a029785.
24. Khan ZA, Singh C, Khan T. Correlates of physical disability in the elderly population of rural North India (Haryana). Journal of family & community medicine. 2018 Sep;25(3):199-204.
25. Queiroz AM, Estrazulas JA, Garnelo L, Mainbourg EM, Fonseca FR, Herkrath FJ. Self-reported chronic back pain in the elderly living in rural riverine areas in the Amazon. Rural and Remote Health. 2022 Jan 1;22(1): 6911-21.
26. Sengupta T, Paul B, Banerjee A, Das R, Halder R. Chronic musculoskeletal pain among elderly individuals in a rural area of West Bengal: A mixed-method study. Malaysian Family Physician: the Official Journal of the Academy of Family Physicians of Malaysia. 2023;18:25.
27. Ibrahim AA, Akindele MO, Ganiyu SO. Effectiveness of patient education plus motor control exercise versus patient education alone versus motor control exercise alone for rural community-dwelling adults with chronic low back pain: A randomised clinical trial. BMC Musculoskeletal Disorders. 2023 Feb 23;24(1):142.
28. Cruz-Jentoft AJ, Bahat G, Bauer J, Boirie Y, Bruyère O, Cederholm T, Cooper C, Landi F, Rolland Y, Sayer AA, Schneider SM. Sarcopenia: revised European consensus on definition and diagnosis. Age and Ageing. 2019 Jan 1;48(1):16-31.
29. Pérez Palmer N, Trejo Ortega B, Joshi P. Cognitive Impairment in Older Adults: Epidemiology, Diagnosis, and Treatment. Psychiatric Clinics of North America. 2022 Dec;45(4):639-61.