Motoric cognitive risk syndrome in older adults at a health service in the Distrito Federal: a cross-sectional study

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Abstract

Objective: To verify the prevalence of the motoric cognitive risk syndrome (MCR) in older adults from the Distrito Federal (DF), Brazil, who attended the health services of a reference unit in Geriatrics and Gerontology, compare groups of older adults with and without the syndrome and investigate the possible associated factors for the development of this syndrome. *Method:* This is an observational cross-sectional analytical study, developed with older adults (age ≥ 60 years) with independent gait and without severe cognitive dysfunctions, who had a record of sociodemographic data, cognitive assessment, functional capacity and gait speed in medical records dated 2017 to 2019. Data analysis was expressed as mean and standard deviation, frequency and percentage, and *odds ratios* (OR) with 95% confidence intervals. Comparisons between groups with and without MCR were made using the chi-square, U Mann Whitney and t-student tests. *Results:* There were no significant differences in the comparison of variables between groups. The prevalence of MCR in the studied population was 24%. None of the factors analyzed showed an association with the presence of the syndrome. *Conclusion:* The prevalence of MCR in the sample was 24% and was shown to be higher in the population of the DF when compared to the populations studied in other countries. There were no differences between the groups of older adults with and without the syndrome, and the associated factors were not found. Screening for the syndrome is hugely relevant, as, from these findings, mechanisms can be developed to prevent dementia in old people.

Keywords: Health of the Eldely. Syndrome. Cognitive Dysfunction. Walking Speed. Dementia.

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The authors declare there are no conflicts of interest in relation to the present study.

No funding was received in relation to the present study.

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Received: September 22, 2020
Approved: March 19, 2021

http://dx.doi.org/10.1590/1981-22562020023.200285

INTRODUCTION

The aging process has repercussions for several physiological changes at all levels in the body's systems, the main characteristic of this process being the decrease in the physiological reserve, with a consequent decline in the functional capacity of the old person[1]. The vulnerability to damage, resulting from the flaws that arise in the body's molecules, cells and tissues throughout the aging process, can favor the acquisition of age-related diseases, which have the potential to generate disability and fragility[2].

Within this aging process, brain aging is noteworthy, which is characterized by the number of neurobiological, anatomical, metabolic, neurochemical and neuronal circuit changes, directly affecting the sensory motor and cognitive functions of old people[3,4], being considered an important marker in relation to the functional capacity of this group[5].

Another important marker of functional capacity in old people relates to gait speed, which acts as a marker of motor and cognitive functions. In healthy old people, gait speed has significant relationships with scores on cognitive assessment tests[6], and reduced gait speed has been shown to be a predictive factor of cognitive decline in this population[6–9].

In this context, the motoric cognitive risk syndrome (MCR) appears as an alternative for the early detection of the risk of developing dementia and dysfunctions / disabilities, being defined as the presence of cognitive complaints and slow gait in old people who do not have a diagnosis of dementia or inability to move[10,11]. Screening for this syndrome is extremely relevant, as its presence has been associated with frequent risk factors in the Brazilian population, such as heart disease, chronic diseases and visual impairment[12–15], in addition to being shown to be predictive of the development of dementias, risk of falls, dysfunctions / disabilities and mortality in old people[16,17].

In addition, Brazil is the second country with the highest prevalence of dementia globally[18], which favors the hypothesis that MCR may be more prevalent in our old people population. Thus, the present study aimed to verify the prevalence of MCR in old people in the Federal District (DF) who attended health services at a reference unit in Geriatrics and Gerontology, to compare groups of old people with and without the syndrome and to investigate the possible factors associated with the development of this syndrome in the population described.

METHOD

The present study was developed as an observational, cross-sectional and analytical research using secondary data from medical records.

The study was carried out using a convenience sample, and the data were collected from the medical records of patients who were referred by the Basic Health Units (UBS) in the region and admitted to the elderly care service of a reference unit in Geriatrics and Gerontology (secondary level), between the years 2017 to 2019.

Figure 1 shows the flowchart of the users who were taken to the reference unit in Geriatrics and Gerontology and their distribution according to the inclusion and exclusion criteria.

The reception was performed by a multidisciplinary team composed of a nurse, a physiotherapist, a nutritionist and a social worker or psychologist. This team was responsible for conducting an anamnesis based on the criteria of the comprehensive geriatric assessment (CGA)[19] and for conducting screening tests of cognitive function[20], functional capacity[21–25] and social / psychological vulnerability, and after performing this assessment, the team defined whether the user would be admitted to this unit or if the counter-referral would be made to the UBS of origin.

The results of these evaluations performed during the reception were recorded in spreadsheets, through a computer program, and in the medical records of the old people, and the data collection used in this study (and described a posteriori) was done through these reception records.

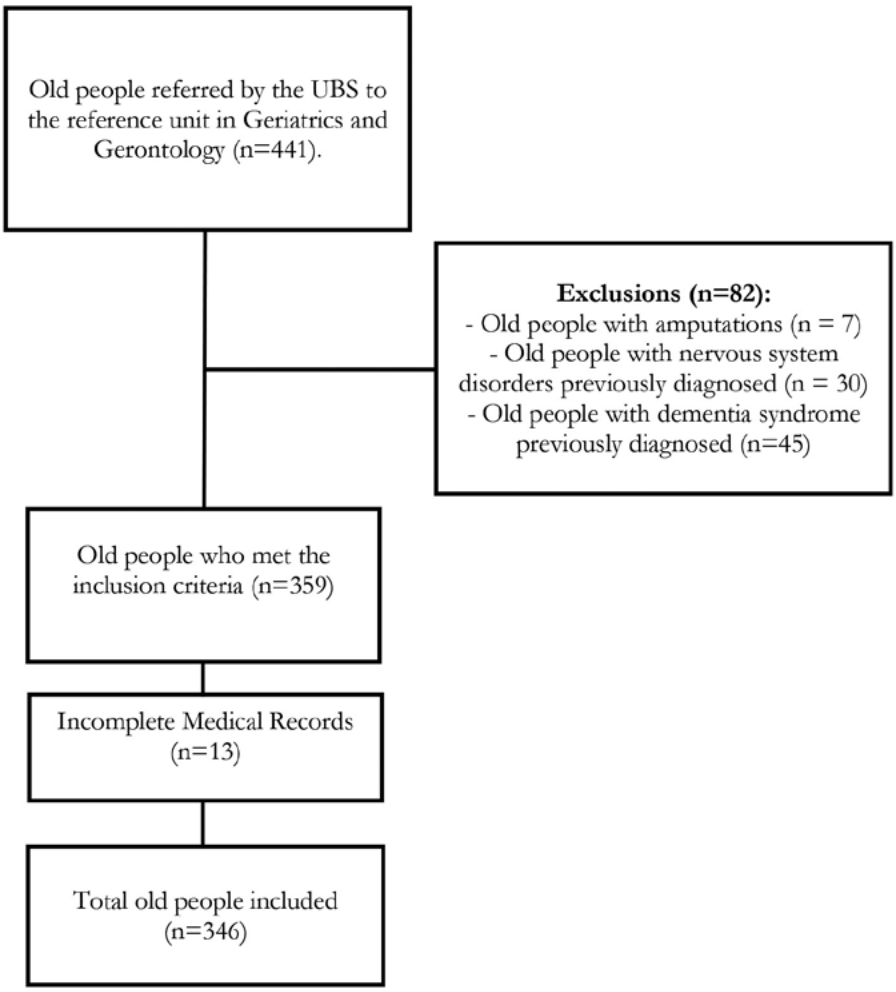

Figure 1. Flowchart of sample capture. Taguatinga, DF, 2017 to 2019.

This study included data from the medical records of people aged 60 years or over, capable of walking through independent gait and who underwent tests to assess gait speed and cognitive performance, as well as independence for carrying out activities of daily living[10].

The following exclusion criteria were adopted: old people with severe motor dysfunction already in place, with a previous diagnosis of dementia syndrome, even though the disease was in its initial stage[10,11], in addition to other disorders of the nervous system (eg sequeale of stroke, Parkinson's disease, among others) and amputations. Medical records data that were not fully filled out and that lost information could not be retrieved were also excluded from the study.

Regarding the MCR diagnostic criteria, in order for their presence to be recognized, the old person had to present four characteristics: I) cognitive complaints assessed in neuropsychological tests, II) slow gait, characterized as gait speed one standard deviation or more below the predicted, according to age and sex, III) preserved ability to carry out their activities of daily living (ADL), and IV) absence of the diagnosis of dementia[10].

In this study, to detect the presence of MCR, cognitive function was measured using the Mini Mental State Examination (MMSE), which assesses the presence of cognitive changes. The cutoff points adopted for the existence of changes in the MMSE were: for illiterate old people, the test score was less

than 18 points; for old people with up to four years of schooling, the test score is less than 24 points; for old people with up to eight years of schooling, the test score is less than 26 points; and for old people with schooling greater than or equal to nine years of study, the test score is less than 27 points out of a total of 30 points, assessing the cognitive domains of temporal orientation, spatial orientation, immediate memory, attention and calculation, and evocation and language[20].

The detection of slow gait was performed using the usual gait speed test (UGS). In a corridor of approximately 10 meters in length, the participants were instructed to walk at a comfortable speed the referred distance, the first three and the last four meters being excluded. The performance in the test was timed and the UGS value was determined by dividing the distance covered by the time obtained on the stopwatch, with the value of 0.8 meters / second being adopted as the cut-off score[24,26].

The assessment of the ability of the old person to perform their ADL was performed using two instruments: the Katz index, to measure the degree of independence for basic activities of daily living (BADL)[21], and the Lawton & Brody questionnaire, to assess the degree of independence for instrumental activities of daily living (IADL)[22].

Participants were classified as independent for BADL when they had a test score of 0, need assistance for BADL when they had test scores ranging from 1 to 5 points, and totally dependent for BADL when they had a test score of 6 points[21,23]. As for the IADL, the participants were considered independent when they had a score on the test equal to 27 points, they need assistance when they had scores on the test ranging between 18 and 26 points, and totally dependent when they had scores on the test ranging between 9 and 17 points[25].

Once a week, the two researchers involved in the study accessed the data record system of patients at the reference unit in Geriatrics and Gerontology (DF) and collected the necessary data for the research, and this collection took place between the months of March and May 2020.

Data were analyzed descriptively using measures of central tendency (mean and median) and variability (standard deviation and interquartile range [25% and 75% percentiles]) for continuous data and measures of absolute and relative frequency for categorical data. The distribution of continuous data was analyzed using the Kolmogorov-Smirnov test. The comparison of categorical data between groups of old people with and without MCR was analyzed using the chi-square test, and continuous numerical data using the Mann-Whitney U test (non-parametric data) and independent Student's t test (parametric data). The values of the w indexes were calculated as measures of the effect sizes between the groups, being considered small effect ($d = 0.20–0.49$ and $w = 0.10–0.29$), medium effect ($d = 0.50– 0.79$ and $w = 0.30–0.49$) and a large effect ($d \geq 0.80$ and $w \geq 0.50$). Univariate logistic regression was used to determine associations between the characteristics investigated with the identification of MCR. Odds ratios (OR) with a 95% confidence interval were calculated for each independent variable. The significance level of 5% was considered.

Respecting the ethical aspects addressed in Resolutions 466/2012 and 510/2016, this research was submitted to and approved by the Research Ethics Committee (CEP) of the State Health Department of the Federal District (SES / DF) (Opinion 4.198. 150/2020). Data collection was carried out based on medical record research, with participants not having to sign the Informed Consent Form (ICF).

RESULTS

The clinical and sociodemographic characteristics of the old people who comprised the sample of this study are shown in Table 1. The analyzes indicated that there was a greater predominance of female subjects in the sample (71.4%). In addition, the majority (76.0%) of the old people had low education (illiteracy or elementary education), polypharmacy (68.5%) and independence to perform basic activities (75.7%) and instrumental activities of daily living (57.5%).

Table 1. Clinical and sociodemographic characteristics of the sample (N=346). Taguatinga, DF, 2017 to 2019.

Variables	General Sample
Gender, % (n)	
Female	71.40 (247)
Male	28,60 (99)
Age	
mean (SD)	77.71 (±8.10)
median [percentiles 25%; 75%]	78.00 [72; 84]
Schooling,% (n)	
Illiterate	28.60 (99)
Elementary School	47.40 (164)
High school	19.70 (68)
University education	4.30 (15)
Diagnostics,% (n)	
Systemic arterial hypertension (yes)	74.30 (257)
Diabetes Mellitus (yes)	34.40 (119)
Musculoskeletal changes (yes)	42.80 (148)
Depression (yes)	23.80 (82)
Number of medications	
mean (SD)	5.55 (±3.35)
median [percentiles 25%; 75%]	5.00 [3; 8]
Polypharmacy (yes), % (n)	68.50 (237)
BMI	
mean (SD)	26.11 (±4,88)
median [percentiles 25%; 75%]	25.63 [22.87; 28.52]
Nutritional status,% (n)	
Low Weight (BMI <22 Kg / m²)	18.20 (63)
Eutrophy (BMI = 22 to 27 Kg / m²)	43.60 (151)
Excess Weight (BMI> 27 Kg / m²)	38.20 (132)
Cigarette exposure (yes), % (n)	31.50 (109)
Alcohol consumption (yes) % (n)	14.70 (51)
Physical exercise practice (yes),% (n)	23.40 (81)
Fall history (yes),% (n)	34.10 (118)
Basic activities of daily living,% (n)	
Independent	75.70 (262)
Assistance	15.90 (55)
Dependent	8.40 (29)
Instrumental activities of daily living,% (n)	
Independent	57.50 (199)
Assistance	24.90 (86)
Dependent	17.60 (61)

SD: standard deviation; BMI: body mass index.

In this study, 24% of the old people investigated had MCR. The criteria identified and analyzed in each group are shown in Table 2. Among the group without MCR, the criterion for the most prevalent syndrome was independence for BADL, followed by cognitive deficit and slow gait. All criteria showed a significant difference (p <0.001) in the comparison between groups of old people with and without MCR.

None of the factors examined showed a difference between the study groups. The comparison of these factors between the groups is shown in Table 3.

In the univariate logistic regression analysis, none of the factors analyzed proved to be a factor associated with the presence of MCR. This result is shown in Table 4.

Table 2. Diagnostic criteria investigated for the presence of motor cognitive risk syndrome (N=346). Taguatinga, DF, 2017 to 2019.

Variables	General Sample	Old people without MCR (n=263)	Old people with MCR (n=83)
MCR, % (n)			
Positive	24.00 (83)	-	-
Negative	76.00 (263)		
Basic activities of daily living,% (n)			
Independent	75.70 (262)	68.10 (179)	100.00 (83)
Assistance	15.90 (55)	20.90 (55)	0.00 (0)
Dependent	8.40 (29)	11.00 (29)	0.00 (0)
BADL criterion (yes-independent),%(n)	75.70 (262)	68.10 (179)	100.00 (83)
(MMSE score)			
mean (SD)	19.29 (±6.57)	20.96 (6.13)	13.98 (4.89)
median [percentiles 25%; 75%]	20.00 [15; 24]	22.00 [18; 26]	15.00 [10; 17]
Cognitive criterion (yes-cognitive deficit),%(n)	64.70 (224)	53.60 (141)	100.00 (83)
Usual gait speed (m/s)			
mean (SD)	0.83 (±0.30)	0.90 (0.30)	0.61 (0.14)
median [percentiles 25%; 75%]	0.80 [0.60; 1.00]	0.90 [0.75; 1.00]	0.60 [0.50; 0.75]
Gait criterion (yes – UGS<0.8m/s),%(n)	47.70 (165)	31.20 (82)	100.00 (83)

MCR: Motoric cognitive risk syndrome; MMSE: Mini-Mental State Examination; p<0.001.

Table 3. Comparison of the variables under study among old people with and without the motoric cognitive risk syndrome (N=346). Taguatinga, DF, 2017 to 2019.

Variables	Old people without MCR (n=263)	Old people with MCR (n=83)	*p*-value	Effect size (power)
Gender***, % (n)				
Female	70,30 (185)	74,70 (62)	0,48	0,04 (41%)
Male	29,70 (78)	25,30 (21)		
Age*				
mean (SD)	77,49 (±8,10)	78,42 (8,12)	0,36	0,11 (15%)
median [percentiles 25%; 75%]	77,00 [72; 83]	78,00 [72; 85]		
Schooling***,% (n)				
Illiterate	27.40 (72)	32.50 (27)	0.14	0.12 (41%)
Elementary School	45.60 (120)	53.00 (44)		
High school	22.10 (58)	12.00 (10)		
University education	4.90 (13)	2.40 (2)		

to be continued

Continuation of Table 3

Variables	Old people without MCR (n=263)	Old people with MCR (n=83)	*p*-value	Effect size (power)
Diagnostics ***,% (n)				
SAH (yes)	75.30 (198)	71.10 (59)	0.47	0.04 (41%)
DM (yes)	36.90 (97)	26.50 (22)	0.08	0.09 (41%)
Musculoskeletal changes (yes)	44.10 (116)	38.60 (32)	0.44	0.04 (41%)
Depression (yes)	24.00 (63)	22.90 (19)	0.88	0.01 (41%)
Number of medications **				
mean (SD)	5.38 (±3.17)	6.07 (3.83)	0.20	0.20 (34%)
median [percentiles 25%; 75%]	5.00 [3; 7]	5.00 [3; 9]		
Polypharmacy (yes) [c], % (n)	67.30 (177)	72.30 (60)	0.41	0.04 (41%)
BMI**				
mean (SD)	25.99 (±4.86)	26.51 (4.92)	0.48	0.11 (13%)
median [percentiles 25%; 75%]	25.64 [22.77; 28.30]	25.58 [23.07; 29.73]		
Nutritional status ***,% (n)				
Low Weight (BMI <22 Kg / m²)	19.40 (51)	14.50 (12)	0.57	0.06 (41%)
Eutrophy (BMI = 22 to 27 Kg / m²)	43.30 (114)	44.60 (37)		
Excess Weight (BMI> 27 Kg / m²)	37.30 (98)	41.00 (34)		
Cigarette exposure (yes)***, % (n)	31.60 (83)	31.30 (26)	0.96	0.002 (41%)
Physical exercise practice (yes)***,% (n)	25.10 (66)	18.10 (15)	0.23	0.07 (41%)
Fall history (yes)***,% (n)	34.60 (91)	32.50 (27)	0.79	0.02 (41%)
IADL***, % (n)				
Independent	57.40 (151)	57.80 (48)	0.20	0.09 (41%)
Assistance	23.20 (61)	30.10 (25)		
Dependent	19.40 (51)	12.00 (10)		

MCR: motoric cognitive risk syndrome; SAH: systemic arterial hypertension; DM: diabetes mellitus; BMI: body mass index; IADL: instrumental activities of daily living; * Variables with normal distribution (Kolmogorov-Smirnov test); Intergroup comparisons using the independent Student t test; ** Variables with non-normal distribution (Kolmogorov-Smirnov test); Intergroup comparisons using the Mann-Whitney U test; *** Categorical variables; Comparisons using the chi-square test.

Table 4. Univariate logistic regression analysis to identify factors associated with motoric cognitive risk syndrome in the sample (N=346). Taguatinga, DF, 2017 to 2019.

Variables	Occurrence of MCR OR [95% CI]	*p*-value
Gender	1.245 [0.710; 2.182]	0.444
Age	1.014 [0.984; 1.046]	0.359
DM	0.617 [0.357; 1.068]	0.084
Depression	0.938 [0.522; 1.684]	0.830
SAH	1.239 [0.714; 2.150]	0.446
Musculoskeletal changes	0.795 [0.480; 1.317]	0.373
Medications	1.062 [0.988; 1.142]	0.103
Polypharmacy	0.789 [0.457; 1.361]	0.394
BMI	1.021 [0.972; 1.073]	0.402
Physical activity	0.658 [0.353; 1.230]	0.190

MCR: Motoric cognitive risk syndrome; OR = Odds Ratio; CI = Confidence Interval; DM: diabetes mellitus; SAH: systemic arterial hypertension; BMI: body mass index.

DISCUSSION

This study aimed to evaluate the prevalence, to compare the groups of old people with and without MCR and to investigate the factors associated with its occurrence, which has been shown to be predictive of dementia in old people from other countries[10,11,14,16,17,27].

Our hypothesis consisted of a higher prevalence of the syndrome in Brazilian old people, when compared to old people from abroad, due to the socioeconomic conditions of the population of the country, specifically the Federal District. The findings of the present study corroborate this hypothesis, and the sample of this research found a prevalence of 24% of old people with MCR, while in previous studies, carried out in other countries, the prevalence of the syndrome varied between 2.65 and 12.8% of the sample[13,14,28,29].

However, it is noteworthy that this higher prevalence rate of MCR in the old people in this study may be related to the selection of a sample by convenience, using data from medical records of old people who attended health services, which may indicate a more fragile and vulnerable sample, since this group has diseases that require greater complexity of health care, having been referred to a referral service. In addition, this profile of old people (old people who need health services) is characterized by having lower income, low education, not practicing physical activity regularly and presenting a high risk for the occurrence of cardiovascular and metabolic diseases, for example[30], which may favor even more functional disability and other health problems.

In addition, in relation to the MCR diagnostic criteria, in the present study, the old people who presented the syndrome had worse performance on the cognitive test and slower gait than the old people who did not have the MCR. To explain the difference in cognitive performance between the old people with and without the syndrome, Maguire et al.[14] evaluated some domains of cognitive function and found that old people with MCR had worse performance in tests of memory, global cognition and sustained attention than old people without the syndrome. Regarding the differences in gait speed of the old people with and without MCR, Ayers and Verghese[31] analyzed the gait parameters and found that the old people with the syndrome had shorter stride length and less time in the swing phase when compared to the old people without the MCR.

In the comparison between the groups of old people with and without MCR, in this study, there were no significant differences between the groups for the low education, presence of chronic diseases, polypharmacy, overweight and physical inactivity variables, which differs from the findings of previous researches that demonstrated significant differences for the presence of these variables between the groups[13,32].

In addition, previous studies that analyzed the factors associated with the presence of MCR found that the practice of physical activity[12,33], being overweight[12,14,28,33], depression[12,14,33], cardiovascular diseases (such as systemic arterial hypertension)[34], musculoskeletal changes (osteoporosis) and polypharmacy[33], influence the occurrence of the syndrome, which differs from the findings of the present study, which showed no relationship between these same factors investigated with the presence of MCR. This result can be explained by the sample size of this study, which was not sufficient to generate an adequate effect (power) size - 80% - for any of the variables analyzed, and by the selection of participants through a convenience sample from a medium-complexity health service, these being limitations of the research.

Despite these limitations, this was a pioneering study in the investigation of MCR in the population of Brazil, specifically in the Federal District, being a relevant research because this syndrome has been related not only to the progression to dementia, but also to other health problems, such as brain and musculoskeletal disorders - which affect cognitive and motor changes that contribute to frailty in old people[35]; increased risk of falling and increased mortality rate[16].

CONCLUSION

This research verified the prevalence, compared two groups of old people and analyzed the possible

factors associated with the motoric cognitive risk syndrome, a geriatric syndrome predictive of dementia. In the sample, selected for convenience and in a non-probabilistic way, and coming from a health service, the prevalence rate of this syndrome was higher than the rates recorded in other studies, but there were no differences between the groups of old people with and without the syndrome for the variables under study, with the exception of diagnostic variables, and the factors associated with this higher prevalence were not found. However, these findings are extremely relevant for clinical practice, since by detecting the prevalence of the syndrome, mechanisms can be developed for the prevention and control of the development of dementia in old people, since dementia affects the functional capacity and the quality of life of this group. Further research with a larger number of participants is necessary to define the prevalence rate of the syndrome on a national basis and to allow verification of the factors associated with the development of the motoric cognitive risk syndrome.

Edited by: Maria Helena Rodrigues Galvão

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