



Correlations between low back pain and functional capacity among the elderly

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Abstract

Objective: To investigate the association between low back pain and functional capacity among non-institutionalized elderly persons. *Method:* A cross-sectional observational study of non-institutionalized elderly persons was performed. The Timed Up and Go (TUG) and Sitting-Rising Test (SRT) functional tests were used, together with the Roland Morris Disability Questionnaire (RMDQ). *Result:* A total of 99 elderly persons of both genders were included. Kendall's Correlation analysis showed a significant correlation between the RMDQ and the SRT scores for the act of sitting ($p=0.001$) and the act of lifting ($p=0.028$). Despite the statistical significance, these two variables were weakly correlated ($r=-0.239$; $r=-0.163$). The results also identified a statistically significant correlation between the TUG and SRT tests for the act of sitting ($r=-0.222$; $p=0.003$) and the act of lifting ($r=-0.206$; $p=0.006$). *Conclusion:* It was observed that most of the non-institutionalized elderly persons had good functional capacity. It is also possible to affirm that there is an association between low back pain and functional capacity.

Keywords: Low Back Pain. Motor Activity. Quality of Life. Aging. Elderly.

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INTRODUCTION

Low back pain is highly incidental, can be triggered by several factors and interferes with the functionality of adults and the elderly¹. Yet its presence without the existence of associated orthopedic or rheumatic diseases is increasingly common. This symptom has been shown to be related to changes in muscle function^{2,3}.

The static and dynamic stability of the spine is made possible by the joint action of passive tissues and contractile elements^{4,5}. Impaired function of the spinal muscles can result in muscle fatigue, due to the excessive overloads that are imposed on the passive elements of the lumbar spine (intervertebral discs, capsules and ligaments) promoting the plastic deformation of these structures, which are sensitive to distension, and triggering low back pain⁶.

Pain-related disability affects emotional, psychosocial, and functional capacity, and mainly affects the elderly. The functional health of the elderly has been associated with quality of life (QoL), social interaction, intellectual status, emotional state and the attitude of the individual about the world. Functional capacity has attracted increasing attention in recent years, as disability can lead to an increase in the number of chronic diseases and cause difficulties in maintaining autonomy, which is strongly linked to quality of life, during old age. This decline can make the elderly individual dependent on other people or some type of care⁷⁻¹⁰. Considering the growing global elderly population, this dysfunction has generated a great deal of discussion about healthy aging.

According to Collucci¹¹, the population over 60 will more than triple in the next 20 years, from the current 22.9 million (11.34% of the population) to 88.6 million (39.2%). Positions such as those of Spirduso¹², who conceptualized aging as "a process or set of processes that occur in living organisms and that with the passage of time lead to a loss of adaptability, functional deficiency, and, finally, death" and Rossi et al¹³, who related aging to bodily deterioration, decline and disability, are relevant to the discussion of this issue.

Low back pain is a major cause of complaints among these individuals, triggering excessive negative beliefs and fears, characterized by increased pain

associated with the practice of any physical activity, where elderly individuals feel the algia means they are incapacitated and prevented from performing simple activities of daily living such as sitting, rising and walking. The insertion of the elderly into physical activities results in a greater capacity for autonomy, which, in turn, can improve their QoL¹⁴.

Physical exercise promotes improvement in functional capacity and physical fitness. The benefits from increased levels of regular physical activity range from improved functional capacity to the regulation of blood pressure and a reduced risk of cardiovascular disease, osteoporosis, diabetes, and certain types of cancer¹⁵.

A great deal of research has recently been undertaken regarding the aging process, from its causes to ways of minimizing the degenerative effects that occur with increasing age, in order to provide the elderly with a healthy and quality aging process¹⁶. This study described the importance of understanding aspects related to functionality and low back pain in the elderly, as such knowledge can contribute to the construction of public policies and activities in general that can contribute to the health of the elderly.

Therefore, the objective of the present study was to verify the association between low back pain and functional capacity in non-institutionalized elderly persons, using functional tests and the Roland Morris Disability Questionnaire (RMDQ) to measure to what extent they are affected by this dysfunction.

METHOD

An observational cross-sectional study of elderly persons was carried out. The study was submitted and approved by the Ethics Research Committee of the Universidade de Cuiabá (The University of Cuiabá) under CAAE number 33829114.7.0000.5165.

Based on a proportion of functional disability in the exposed population of 60%, a proportion of functional disability in the non-exposed population of 45%¹⁷, a significance level of 5% (two-tailed test) and 80% test power, the minimum sample required was calculated as 84 participants. A further 20% of elderly persons were included to cover eventual

losses, giving a calculated sample size was 100 participants. One of the participants did not agree to sign the Free and Informed Consent Form (FICF), resulting in a final sample of 99 elderly people of both genders, who attended the Maria Ignês França Auad and Padre Firmo Duarte Social Centers, both located in Cuiabá. All the individuals were initially consulted about the study proposal and asked if they were interested in participating in the research. After agreeing, they signed the FICF. Those who refused to participate were free to go. Those with dysfunctions caused by stroke, traumatic orthopedic injuries or other pathologies that prevented them from carrying out the functional tests were excluded. Data was collected between September and November 2014.

All those selected in the study were interviewed and completed an identification form containing data about their age, gender and educational level. Three tests were then carried out:

1) Application of the Portuguese language version of the RMDQ for quantification of low back pain, with 24 items with scores of zero or one (yes or no), the sum of which can range from zero (suggesting no disability) to 24 (severe disability). This questionnaire has a cutoff score of 14, that is, individuals with a score greater than 14 have a disability¹⁸.

2) Teste Timed Up and Go (TUG) to assess balance, risk of falls, and functional capacity. The test consists of the observation of a subject as they get up from a chair, walk three meters in a straight line, return to the chair and sits down. This course is timed in seconds and the performance of the subject is graduated according to the time required to complete the task. A time of up to ten seconds is considered normal for healthy, independent adults with no risk of falling; between 11 and 20 seconds is considered normal for the frail or disabled elderly, with partial independence and a low risk of falls, who tend to be independent in most activities of daily living; and over 20 seconds indicates a significant decline in physical mobility and a risk of falls¹⁹.

3) Sitting and Rising Test (SRT) assesses flexibility of the lower limb joints, balance, motor coordination and the relationship between muscle power and body weight, in what can be characterized as minimum muscular fitness. To perform the test the following instruction is given by the evaluator: "Without becoming unbalanced, try to sit and then to rise

from the floor, using the minimum support that you believe is needed". Once the act of sitting has been completed, a score is awarded and the subject is asked to stand up so the evaluator can check the note. Crossing the legs when sitting or standing is allowed, but the individual is not permitted to throw themselves backwards while trying to sit. The SRT measure consists of quantifying how many supports (hands and/or knees or hands on knees or legs) the individual uses to sit and get up from the floor, with one point subtracted for each support. Independent scores are assigned for each of the two actions - sitting and rising. The maximum score is 5 for each of the two actions. A further half a point is removed for any perceptible imbalance²⁰.

Descriptive (mean, standard deviation) and inductive (Kendall Correlation Coefficient Test) statistics were used, adapted to the specific conditions of the results obtained.

RESULTS

A total of 99 individuals were evaluated, of whom 18 were men with a mean age of 68.3 (± 5.3) years and 81 were women with a mean age of 73.3 (± 5.35) years. A total of 27% of the sample had completed high school. The rest had a lower educational level.

The mean, standard deviation and confidence intervals of the mean (95%) RMDQ score and the time spent in the TUG and SRT tests are shown in table 1.

In analysis of the RMDQ score, 81 elderly persons (81%) reported low back pain, with a mean duration of 9.7 (± 10.74) years and a mean score of 7.26. These individuals did not suffer from a disability related to the presence of low back pain. On the other hand, nine (12%) had a cutoff score (>14) indicating functional disability related to low back pain.

When SRT score was analyzed the same elderly patients with pain had a mean score of 1.94 when sitting and a mean score of 1.41 when rising, indicating a decrease in minimum muscular fitness.

Table 2 presents the time-weighted TUG scores. Of the 99 individuals, 66% of could be considered independent and did not have a risk of falls. However, one of the elderly persons had a score associated with an increased risk of falls.

Table 1. Results of Ronald Morris Disability Questionnaire (RMDQ), Timed Up and Go (TUG) and Sitting and Rising Test (SRT). Cuiabá, Mato Grosso, 2014.

Variables	Mean ± sd	CI 95%
RMDQ	7.26 (±5.27)	6.18-9.49
TUG	12.21 (±12.18)	9.78-14.64
SRT-S	2.13 (±1.28)	1.87-2.39
SRT-R	1.57 (±1.16)	1.34-1.80

sd: Standard Deviation; CI95%: Confidence Interval of 95%.

Table 2. Distribution of Timed Up and Go Scores. Cuiabá, Mato Grosso, 2014.

Time (sec)	n	Score
<10	66 (66%)	Normal – independent
11 to 20	32 (33%)	Partial Independence and low risk of falls
20 to 29	1 (1%)	Mobility impairment and risk of falls

Correlation Analysis

Roland Morris Disability Questionnaire X Sitting and Rising Test

Kendall's correlation analysis revealed a significant negative correlation between the RMDQ score and the SRT score for sitting ($r = -0.239, p = 0.001$) and rising ($r = -0.163, p = 0.028$). Despite the statistical significance, these two variables were weakly correlated. It was found that the less serious the disability related to low back pain of an individual is, the better his or her physical fitness will be. Below are the dispersion

diagrams for the action of rising with the RMDQ (Figure 1) and the action of sitting with the RMDQ (Figure 2).

Timed Up and Go v Sitting and Rising Test

The results show that there was a significant negative correlation between the TUG and the SRT for both the action of sitting ($r = -0.222, p = 0.003$) and the action of rising ($r = -0.206, p = 0.006$). This indicates that the lower the physical capacity of the elderly person, the lower their physical fitness. The dispersion diagram for the analysis of TUG and SRT is below (Figure 3).

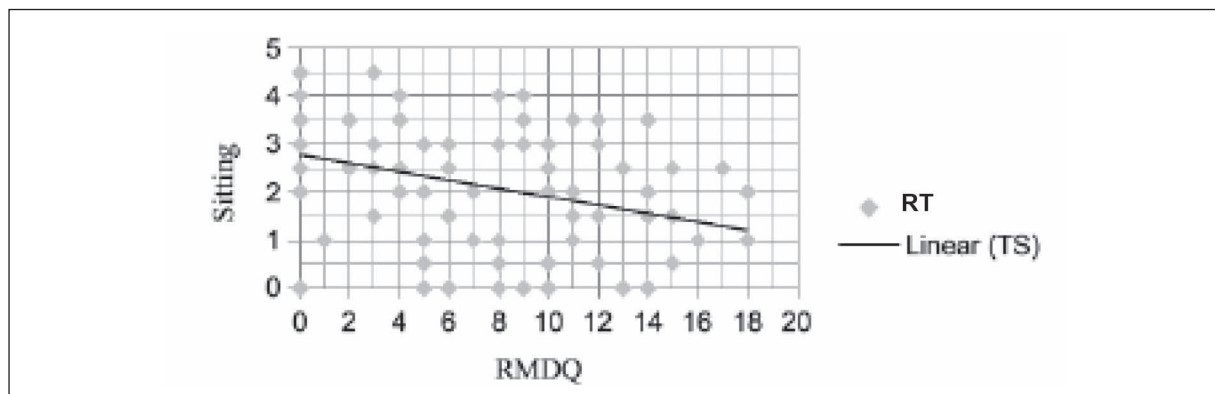


Figure 1. Dispersion Diagram of Sitting and Rising Test (Rising) and Ronald Morris Disability Questionnaire (RMDQ). Cuiabá, Mato Grosso, 2014.

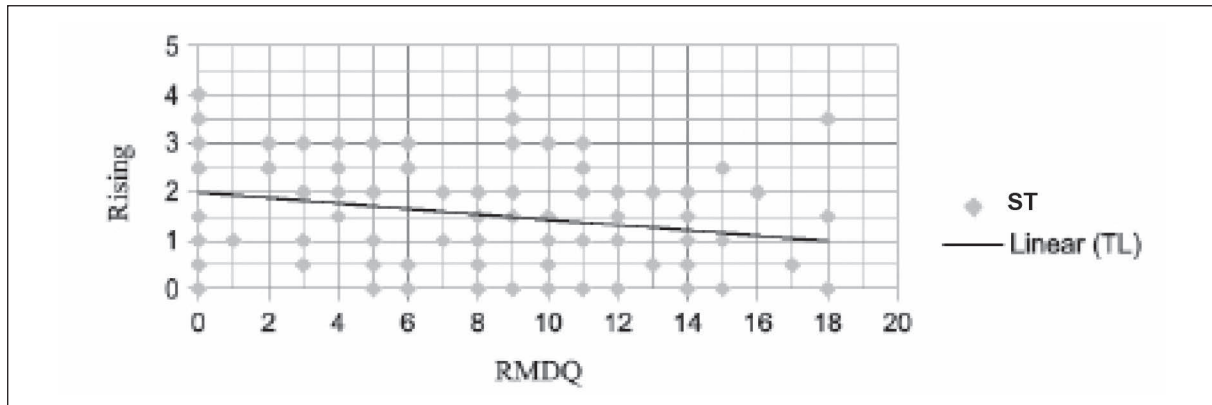


Figure 2. Dispersion Diagram of Sitting and Rising Test (Sitting) and Ronald Morris Disability Questionnaire (RMDQ). Cuiabá, Mato Grosso, 2014.

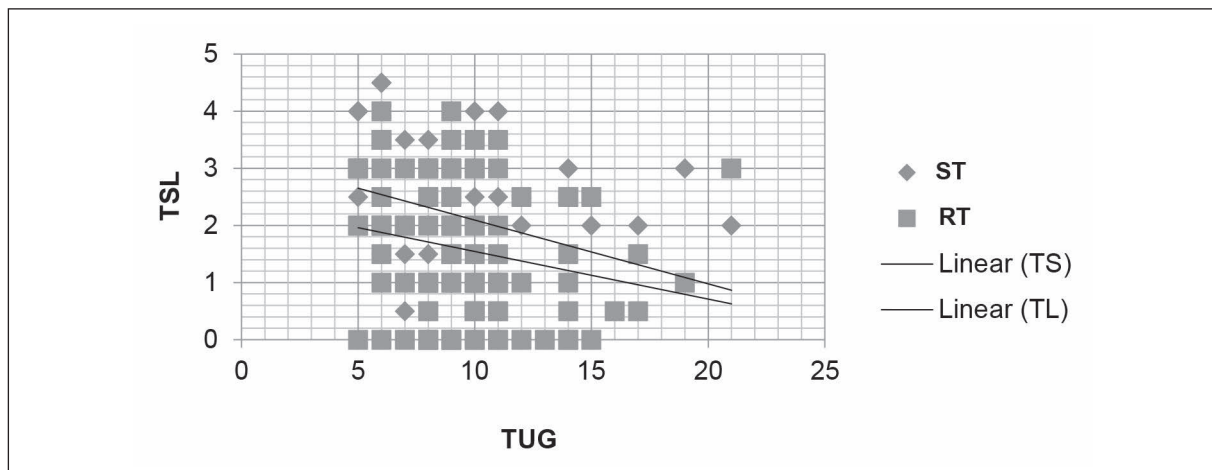


Figure 3. Dispersion Diagram of Timed Up and Go (TUG) and Sitting and Rising Test (SRT). Cuiabá, Mato Grosso, 2014.

DISCUSSION

Among the findings of the present study, it was notable that there was a high incidence of low back pain (81%) among elderly persons evaluated with the RMDQ, despite having an active life. Trellha²¹, in a similar study, found a prevalence of low back pain of 50%. The high susceptibility of this population to this symptomatology is evident, as only 12 individuals of the sample of this study presented a score equal to or greater than 14 in the RMDQ. The other individuals may have physical disability due to low back pain¹⁸.

As with other studies, there was an association between low back pain and functional limitation, which mainly restricted occupational and leisure activities^{22,23}. According to Ocarino et al.²⁴, low back pain can lead to a deficiency in both functional and physical performance.

Another result identified in the present study was the low educational level among the elderly. This is an important finding, as according to Gomes et al.²⁵, educational level affects the overall capacity of an individual to deal with the challenges of

everyday life. Generally, elderly persons with a low educational level have limited financial resources, less access to health care and few sources of knowledge, resulting in a poorer health condition and greater susceptibility to falls.

While the evidence of a positive association between the RMDQ and SRT results requires further research, the findings of the present study allow the observation that flexibility is a physical capacity that conditions the individual for the performance of activities of daily living, as several studies have already demonstrated that its loss may be harmful to individuals²⁶. Other studies have shown that aging accompanied by a loss of flexibility can result in the partial loss of the independence of movements.²⁷

A significant negative correlation was found between the time spent on the TUG test and the SRT for sitting ($p=0.003$), while there was weak correlation for rising ($p = 0.006$). According to Roorda et al.²⁸, sitting and rising are among the most routinely practiced activities in daily life and performance in these actions is closely related to the risk of falls. Gomes et al.²⁹ emphasized the decline in physical fitness, explaining that this factor is related to the reduction of levels of muscle strength, impaired walking performance and changes in balance, which together increase the risk of falls.

Considering the high incidence of low back pain with physiological changes, such as the loss of strength and flexibility, impaired body balance, and a high risk of falls, in the aging process, it can be inferred that exercise, in addition to combating physical inactivity, contributes significantly to the maintenance of the physical fitness of the elderly, both in terms of health and functional abilities³⁰.

One of the limitations of this study One of the limitations of the present study was the sample size, which was small considering the total number of people who used the social centers. However, the right of the elderly to refuse to participate in the study was guaranteed. A second limitation was the lack of multivariate analysis. The bivariate analysis performed in the study, however, was sufficient to validate the applicability of the results found, as it allowed the associations between the complaints of low back pain and the functional tests of this population to be identified.

CONCLUSION

While it can be concluded that most of the non-institutionalized elderly persons who were evaluated had good functional capacity, it is possible to affirm that there is an association between low back pain and functional capacity. It is also possible to affirm that there is an association between low back pain and functional capacity.

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