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Correlation between a functional performance questionnaire and physical capability tests among patients with low back pain

Correlação entre um questionário de desempenho funcional e testes de capacidade física em pacientes com lombalgia

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Abstract

Contextualization: Low back pain is a set of painful manifestations that may cause limitations to several aspects of an individual's life. The model of the International Classification of Functioning, Disability and Health (ICF) proposed by the World Health Organization provides a structure for understanding the functioning and disability associated with health conditions, thus enabling significant descriptions of an individual's health. The ICF uses the terms "capacity" and "performance" to refer to different aspects of function and to differentiate between patients' functional status. In clinical practice, it is necessary to determine whether there is any association between these different aspects. **Objectives:** To analyze the correlation between the Roland Morris functional performance questionnaire and physical capacity tests (sit-to-stand and 50-foot walk) among patients with low back pain. **Methods:** Thirty patients of mean age 43.16 years, with a diagnosis of low back pain, were assessed using the Roland Morris questionnaire and the capacity tests. **Results:** Analysis using Pearson's correlation showed a significant but weak correlation between the Roland Morris score and the sit-to-stand test (r=0.38; p=0.0388). No significant correlation was observed between the questionnaire score and the 50-foot walk test (r=0.24; p=0.1862). **Conclusion:** The results indicate the need to use instruments that evaluate both aspects of function (capacity and performance) among patients with low back pain, so that a more complete functional profile of such individuals can be defined.

Key words: low back pain; international classification of functioning; disability and health; function.

Resumo

Contextualização: A lombalgia é um conjunto de manifestações dolorosas que pode acarretar limitações em vários aspectos da vida de um indivíduo. O modelo de Classificação Internacional de Funcionalidade, Incapacidade e Saúde (CIF) proposto pela Organização Mundial da Saúde (OMS) fornece uma estrutura para o entendimento da funcionalidade e da incapacidade associadas aos estados de saúde, possibilitando uma descrição significativa da saúde de um indivíduo. A CIF utiliza os termos capacidade e desempenho para se referir a aspectos distintos da função e para diferenciar o estado funcional dos pacientes. Na prática clínica, é necessário saber se existe uma associação entre esses distintos aspectos. **Objetivos:** Analisar a correlação entre o questionário de desempenho funcional de Roland Morris e os testes de capacidade física (sentado para de pé e a caminhada de 15,24 metros) em pacientes com lombalgia. **Métodos:** Trinta pacientes com diagnóstico de lombalgia, média de idade de 43,16 anos, foram avaliados com o Roland Morris e os testes de capacidade. **Resultados:** A análise de correlação de Pearson demonstrou correlação significativa, porém fraca entre o escore do Roland Morris e o Teste Sentado para de Pé (r=0,38; p=0,0388). Não foi observada uma correlação significativa entre o escore do questionário e o teste de caminhada de 15,24 m (r=0,24; p=0,1862). **Conclusão:** Esses resultados indicam a necessidade de se utilizarem instrumentos que avaliem ambos os aspectos (capacidade e desempenho) em pacientes com lombalgia, para que se possa definir um perfil funcional mais completo desses indivíduos.

Palavras-chave: lombalgia; Classificação Internacional de Funcionalidade; incapacidade e saúde; função.

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Introduction

Low back pain (LBP) is a group of painful manifestations that affect the lumbar, lumbosacral or sacroiliac area[1]. These manifestations are among the most common in human beings[1]. Several conditions may trigger LBP, including degenerative and traumatic events in the intervertebral disc or vertebral body[1], excessive overload in work activities[2], excessive movement[2], psychological factors[3], physical inactivity[4], reduced flexibility and strength[5], obesity[6] and smoking[4,7,8]. According to World Health Organization (WHO) data, about 80% of adults will have at least one acute episode of back pain over their lifetime, and about 90% of them will have more than one episode of LBP[9].

A health condition such as LBP may result in several limitations in various aspects of an individual's life. The International Classification of Functioning, Disability and Health (ICF) model, proposed by the WHO, provides a structure for understanding the classification of functioning and disability associated with health conditions, thus allowing a more thorough and significant description of individual health[9-11]. Furthermore, the ICF enables the use of a universal language that allows interprofessional communication about health-related issues[12-14].

According to the ICF, functioning and disability can be described in three health components called Body Functions and Structures, Activities and Participation[15]. The Body Functions and Structure component consists of physiological and/or psychological functions of body systems and their anatomic parts[9]. In the case of LBP, it is common to find some impairment in this component, such as pain, weakness and muscle imbalances, muscle spasm, decreased muscle flexibility, decreased joint mobility etc[16]. The Activity component describes the individual's ability to execute a task or action in his daily routine[9]. Patients with LBP often have difficulty picking up objects from the floor, climbing and going down stairs, and walking[16,17]. Moreover, this health condition also manifests itself in the component that involves the individual's interactions in his sociocultural environment called Participation[18,19]. In these cases, it is common to find a reduced level of sports activities, more days missed from work and a diminished social life[16,20,21].

The purpose of the rehabilitation of chronic LBP patients is to promote not only an improvement in physical parameters, such as muscle strength, flexibility and mobility, but also an improvement in functional status, allowing the return to work and to usual activities[8]. Although the majority of assessment protocols aim to evaluate the physical parameters classified in the Body Functions and Structures component, there are instruments that allow the assessment of functional status of patients with LBP[22,23]. The impact caused by LBP on the functionality of individuals that suffer from this health condition is a consensus among health professionals, which reinforces the importance to consider the specific functional profile of each patient in assessment and intervention procedures[10].

The ICF uses the capacity and performance constructs to differentiate between patients' functional status. Functional performance is related to what an individual can execute in his own natural environment. This environment includes environmental factors, all aspects of the physical, social and behavioral world[9]. To assess the functional performance of LBP patients, several instruments are proposed by the literature, such as the "Roland Morris" and "Oswestry Low Back Pain" questionnaires, the "Disability Questionnaire", the "Waddell Disability Index" and the "Sickness Impact Profile"[22]. The Roland Morris Questionnaire has been widely used in research and clinical practice as it has been translated, adapted and validated for the Brazilian population.

The capacity construct is used to describe an individual's ability to execute a task or an action in a standardized environment, and it is useful to indicate the highest probable level of functioning that a person can reach in the domain that is being evaluated[9]. To evaluate the individual's full capacity, a standardized environment becomes essential to neutralize the impact of environmental factors on his capacity. This standardized environment can be: a real environment commonly used to evaluate the capacity in test situations or, when this is not possible, an environment that can be considered to have a uniform or standardized impact. Thus, capacity reflects the individual's ability adjusted to the environment[9]. To evaluate the physical capacity of LBP patients, some specific instruments for these aspects of functioning can be used, such as the sit-to-stand test, the 50-foot (15.24 m) walk test, lumbar flexion, five-minute walking test, timed up and go, loaded reach, among others[23].

The existing gap between functional capacity and performance reflects the difference between the impact of actual and uniform environments, and thus provides a useful guide as to what can be done to the environment of the individual to improve performance[9]. Although capacity and performance aim to characterize patients' functional status, it becomes necessary to understand if these parameters, although theoretically distinct, are correlated. The information about the relation between functional capacity and performance may contribute to the analysis of the environmental impact under the functioning of LBP patients, both in clinical practice and in scientific research, given that

the environment can be a facilitator or an impediment in task execution. Furthermore, the characterization of the relationship between these parameters may contribute to a better comprehension of the heath-disease process experienced by LBP patients, allowing health professionals to formulate therapeutic problems and objectives according to the specific functional profile of each individual. Therefore, the purpose of this study was to verify the existing correlation between the Roland Morris functional status questionnaire and physical capacity tests (sit-to-stand and 50-foot walk test) in patients with chronic LBP.

Methods

Sample

The sample consisted of thirty patients of both sexes with a diagnosis of chronic non-specific LBP and under treatment at the university clinic. The inclusion criterion to take part in this study was the presence of recurrent symptoms for more than three months. Patients with neurological, cardiovascular or orthopedic diseases that could limit test execution were not included in the present study. Patients who presented LBP associated with disc herniation and symptoms of radiating pain were excluded from the study. This research was approved by the Research Ethics Committee of Centro Universitário de Belo Horizonte, protocol 084/05.

Instrumentation

The Roland Morris Questionnaire was used to evaluate the participants' functional performance. This questionnaire is composed of 24 items that exemplify some functional consequences of LBP. The Roland Morris has been translated into Portuguese and adapted to the Brazilian population, and it has a high test-retest (ICC of 0.94) and inter-rater reliability (ICC of 0.95)[24]. In addition, this instrument was chosen because of its simple presentation and standardized scoring system[23,25,26].

The participants' physical capacity was evaluated through the sit-to-stand and 50-foot walk tests. These tests were chosen because they have discriminative validity for LBP patients and because they have an adequate level of test-retest reliability (ICC of 0.89 for the sit-to-stand test and of 0.96 for the 50-foot walk test)[23]. These tests also show high inter-rater reliability (ICC of 0.99 for both tests)[23]. In addition, both tests were chosen because they involve common daily tasks such as sitting down, standing up from a chair and walking. A chair was used for the execution of the sit-to-stand test, and a measuring tape was used to measure the distance covered by the patients in the walk test. The time taken to complete both tests was measured with a chronometer.

Procedures

Initially, all participants received information concerning the study procedures and signed an informed consent form agreeing to participate. Next, the Brazil Roland Morris Questionnaire was administered in a private room. The items of the questionnaire were read by the examiner, and the score was calculated considering the number of affirmative answers. Thus, the higher the score, the lower is the individual's functional capacity. Participants were instructed to answer the questions according to their condition at the time of the test.

The participants were then submitted to the physical capacity tests: sit-to-stand and 50-foot walk test[25]. In the sit-to-stand test, the participant sat on a chair without leaning against the back rest and was asked to execute five repetitions of the sit-to-stand movement without hand support, as quickly as possible. Time taken to complete the test was recorded by the examiner. After a five-minute rest, the 50-foot walk test was performed, in which the patient covered a distance of 25 feet (7.62 m), circled an obstacle, and returned to the initial position, covering a total distance of 50 feet (15.24 m). The time taken to execute the test was also measured. Both tests were executed twice and the mean of the two measures was considered for analysis. A rest interval of 3 minutes was observed between the two executions of each test.

Statistical analysis

A Pearson product-moment analysis was used to investigate the relationship between the final score obtained in the Roland Morris questionnaire and the times obtained in the execution of the physical capacity tests: 50-foot walk test and sit-to-stand. For this analysis, a significant level of 0.05 was set.

Results

The sample assessed in the present study had a mean age of 43.16 years (SD=11.23). Mass ranged from 49 to 95.5 Kg (mean=68.88 Kg; SD=10.83), and the mean height was of 1.65 m (SD=0.082). In addition, the mean duration of LBP symptoms was 42.3 months (SD=80.6). The values of mean, standard

deviation and confidence interval of the mean (95%) of the Brazil Roland Morris Questionnaire score, and the time taken to execute the 50-foot walk test and the sit-to-stand test are shown in Table 1.

Table 1. Mean (SD) and confidence interval (95%) for the Brazil Roland Morris Questionnaire scores and performance in the sit-to-stand and 50-foot walk tests.

Variables	Mean (SD)	Confidence Interval 95%
Brazil Roland Morris Questionnaire	9.933 (3.704)	8.608–11.258
Sit-to-Stand Test (s)	11.424 (3.940)	10.014–12.833
50-Foot Walk Test (s)	10.469 (1.729)	9.849–11.088

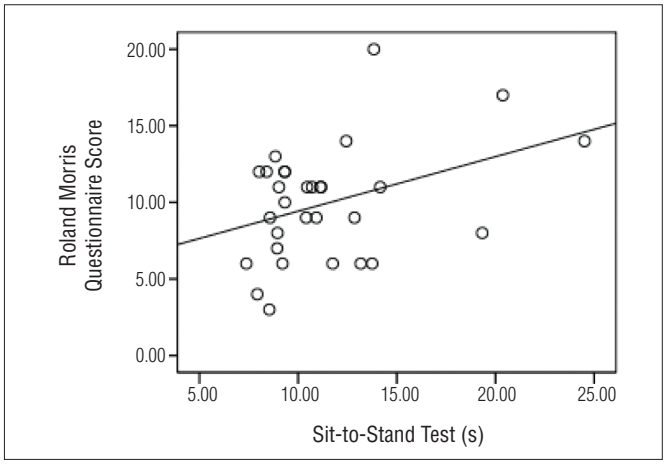

Figure 1. Scatter plot of the correlation between Brazil Roland Morris Questionnaire scores and performance in the sit-to-stand test.

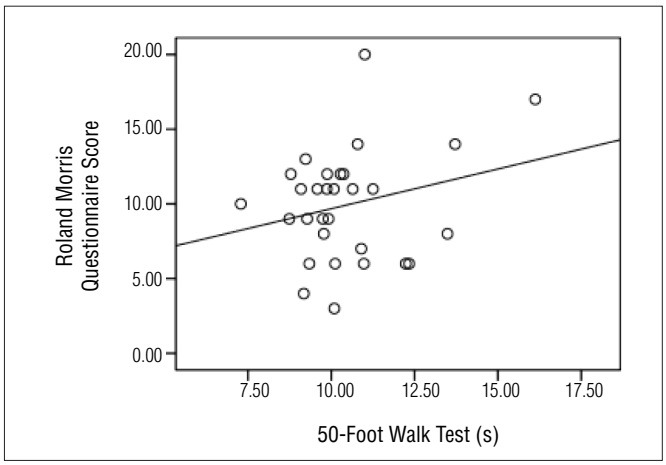

Figure 2. Scatter plot of the correlation between Brazil Roland Morris Questionnaire scores and performance in the 50-Foot Walk Test.

Roland Morris vs. Sit-to-Stand

Pearson's correlation analysis found a significant correlation between the Roland Morris' score and the time taken to complete the sit-to-stand test (p=0.0388; CI 95%=0.020-0.693). In spite of the statistical significance, these two variables are weakly correlated, as the correlation coefficient (r) observed was only 0.38 (Figure 1).

Roland Morris vs. 50-Foot Walk Test

The results showed an absence of statistically significant correlation between the Roland Morris Questionnaire and the 50-foot walk test (r=0.2481; p=0.1862; CI 95%=-0.272-1.335; Figure 2).

Discussion

The majority of studies show that LBP can lead to significant functional impairment that limits especially occupational and leisure activities[16,20,23]. According to the ICF, however, the functional status of patients must be classified according to functional capacity and performance[9]. Simmonds et al.[23] stated that LBP can lead to an impairment in both functional performance and physical capacity. Although these two parameters are distinct, there is little evidence of an association between the measures of functional capacity and performance. In this context, the present study investigated the association between the Roland Morris questionnaire, which evaluates the impact of LBP on functional performance, and the physical capacity tests: sit-to-stand and 50-foot walk test in chronic LBP patients.

The results of the present study demonstrate a significant correlation between the Roland Morris score and the time taken to complete the sit-to-stand test. Although a significant correlation was found, the results indicate that these two variables are weakly correlated, as the r value was only 0.38. Studies that evaluated the association between functional questionnaires and physical capacity tests had varied results[23,25,26]. The results of the present study agree with those of Simmonds et al.[23], who found a significant correlation of 0.45 between the Roland Morris questionnaire and the sit-to-stand test. Even though these authors reported a moderate association, an r of 0.45 should still be considered a weak correlation[27]. Sullivan, Shoaf and Riddle[26] also reported a weak association between a measure of performance and a measure of functional capacity in LBP patients. According to their results, the correlation between

the Roland Morris score and the lumbar flexion test was of only 0.35. Lee et al.[25] also observed a significant but weak correlation (r=0.30), between specific questions of the Roland Morris questionnaire and the sit-to-stand and 50-foot walk tests[25]. In the current study, when considering the time spent in the 50-foot walk test, no significant correlation was found between this variable and the Roland Morris score (p=0.1862; r=0.2481). This result disagrees with the study by Simmonds et al.[23], which found a significant correlation between the score in this questionnaire and the time spent in the 50-foot walk test. However, the correlation observed by these authors was only 0.42, which demonstrates a weak association among these variables[23]. These findings suggest that other factors besides physical capacity can influence functional performance in LBP patients.

According to the ICF, the performance construct describes everything that an individual does in his current environment[9]. Because this current environment includes a social context, performance can also be understood as the individual's involvement in a certain life situation. In contrast, the capacity parameter aims to indicate the highest level of functioning that an individual can reach in a certain health domain[9]. To test this, a standardized environment is needed to neutralize the influence of factors associated with the context (both environmental and personal). Thus, the weak correlation observed between these two parameters may be related to a higher influence of social and environmental factors connected only to the performance parameter, such as family relationships, economic issues, anxiety, depression and temperament.

Despite the high reliability of the questionnaire and tests documented by the literature[23,24] and despite examiner training to apply the instruments, one of the limitations of the present study was that inter-rater reliability was not assessed. Although the Roland Morris questionnaire has been translated and validated to Portuguese[24], the researchers noted that some patients had trouble understanding some of the questions during the tests. This may have influenced these patients' scores. It is also important to highlight that only four participants had scores equal to or higher than 14 in the Roland Morris questionnaire (cutoff score that characterizes the presence of significant disability due to LBP)[24]. The low level of functional impairment in the participants evaluated in the present study is a factor that may have influenced the strength of the correlation between the variables.

The ICF has the purpose of describing and classifying the entire health-disease process experienced by an individual at the levels of body structure and functioning, activities and participation[9]. A specific disease can lead to impairment in functional performance, characterized by what the individual can execute in his natural environment. Similarly, a disease can influence functional capacity, which relates to an individual's ability to execute a certain function in a standardized environment[9]. Therefore, it becomes important to evaluate the association between these two distinct aspects, since they are relevant to the characterization of functionality and disability. Furthermore, a professional approach to chronic LBP patients must consider the importance of personal and environmental factors (physical, social and behavioral aspects) in the functionality and disability of these patients, as these factors interact with all of the health domains described by the ICF[9].

The results of the present study demonstrated that, due to the weak correlation among the variables tested, the physical therapist should not assume that the results obtained in capacity tests applied in the standardized environment of a clinic can be transferred directly to the patient's daily reality. According to the ICF and to the results of the present study, a full understanding and description of the process experienced by chronic LBP patients depends on the interaction between the individual's health condition (including capacity and performance) and their context (personal and environmental)[9]. Given that the main purpose of LBP rehabilitation is to maximize functionality in daily living[28], it becomes necessary to use in clinical practice instruments that evaluate not only the functional capacity, but also the functional performance of LBP patients in their actual context as performance can suffer multiple influences from environmental and personal factors[29,30]. Thus, the physical therapist must be able to identify the discrepancies between the functional level perceived by the patients and their true functional capacity.

The use of instruments that evaluate both parameters is necessary not only to describe the patient's specific functional profile, improving the quality and individuality of the data related to their functional status, but also to identify the effect of treatment at reassessment. The movements and activities of the capacity and performance tests must also be included in the intervention strategies (functional training). In this context, instruments and tests not only serve the purpose of documenting the outcomes, but also provide standards that must be regained during treatment for improved function. The present study allowed a better understanding of the physical capacity and performance of LBP patients in their functional activities, and it allowed the use and dissemination of the ICF terminology, which may be useful in the process of discussing and comparing health status and the functional consequences of a disease.

Conclusion

The results of the present study show that there is no significant correlation between the time spent in the 50-foot walk test and the Roland Morris questionnaire score. However, there was significant but weak correlation between the Roland Morris questionnaire score and the time taken to complete the sit-to-stand test. These results indicate the need to evaluate both aspects (functional capacity and performance) in patients with chronic low back pain.

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