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Correlation between pain intensity and upper limb limitation in subjects with cuff tendinopathy

Correlação entre intensidade dolorosa e limitação de membro superior em sujeitos com tendinopatia do manguito

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ABSTRACT

Introduction: Rotator Cuff Tendinopathy (RMR) causes pain and impairment in shoulder function, but it is not known if both in the same proportion. **Objective:** Verify whether pain intensity correlates with upper limb function in subjects with RMR. **Methods:** Cross-sectional observational study of 60 individuals with RMR. The Visual Analogue Scale (VAS) was used to assess pain and the Disabilities of the Arm, Shoulder and Hand Questionnaire (DASH) for shoulder function. For data analysis, descriptive statistics (means and standard deviation, numerical and percentage presentation) were performed and Spearman correlation was applied using a significance level of 5%. **Results:** The average pain by VAS was 5.02 (moderate). Mild limitation (mean score 34.43) was found in the 30 questions of the DASH questionnaire. Regarding the optional modules, in the module intended for athletes/musicians, there was no limitation of the subjects who practiced this (average score of 11.82). In the work module there was a slight limitation (average score 35.38). There was a low correlation between pain and shoulder function (rs=0.2949; p=0.0222). **Conclusion:** Although subjects with RMR had moderate pain, the correlation was weak between pain and shoulder function.

Keywords: shoulder; rotator cuff; pain; activities of daily living; upper extremity.

RESUMO

Introdução: A Tendinopatia do Manguito Rotador (TMR) acarreta dor e prejuízo na função do ombro, porém não se sabe se ambas na mesma proporção. **Objetivo:** Verificar se a intensidade dolorosa se correlaciona com a função do membro superior em sujeitos com TMR. **Métodos:** Estudo observacional transversal, com 60 indivíduos com TMR. Utilizou-se a Escala Visual Analógica (EVA) para avaliar a dor e o questionário *Disabilities of the Arm, Shoulder and Hand Questionnaire* (DASH) para função do ombro. Para análise dos dados foi realizada estatística descritiva (médias e desvio-padrão, apresentação numérica e percentual) e aplicada a correlação de *Spearman* utilizando nível de significância de 5%. **Resultados:** A dor média pela EVA foi de 5,02 (moderada). Verificou-se limitação leve (pontuação média de 34,43) nas 30 questões do questionário DASH. Em relação aos módulos opcionais, no módulo destinado a atletas/músicos, não houve limitação dos sujeitos que praticavam este (média de pontuação de 11,82). No módulo referente ao trabalho houve limitação leve (média de pontuação de 35,38). Houve correlação baixa entre dor e a função do ombro (rs=0,2949; p=0,0222). **Conclusão:** Embora os sujeitos com TMR apresentassem dor moderada, a correlação foi fraca entre dor e função do ombro.

Palavras-chave: ombro; manguito rotador; dor; atividades cotidianas; extremidade superior.

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INTRODUCTION

Shoulder pain is the third most common musculoskeletal complaint, being more recurrent in adults and its frequency increasing with age[1,2]. In this context, tendinopathies stand out, especially Rotator Cuff Tendinopathies (RMR)[3], which include partial rupture and/or complete injury of the supraspinatus, infraspinatus and/or subscapularis tendons, and may also be associated with tendon tendonopathy of the biceps head[4], as well as inflammatory processes of these structures.

RMR can affect individuals in any age group, and its incidence increases with aging and occupational or recreational occupation[3]. Usually RMR can lead to impairment of shoulder function to varying degrees, mainly due to pain[5]. One of the main ways to verify shoulder pain in the clinical setting is through the Visual Analog Scale (VAS), although this is a subjective assessment of pain, it is easy to use, as well as widely used in many musculoskeletal diseases[6,7].

Due to the pain imposed by the injury, the daily life activities of subjects with RMR can be greatly impaired. This fact leads to decreased function of the affected upper limb, poor quality of life, decreased sleep quality, absenteeism at work, among other impairments[8].

One way of assessing upper limb functionality is by using functional questionnaires such as the Disabilities of the Arm, Shoulder and Hand Questionnaire (DASH). The DASH questionnaire is one of the few translated and validated in Brazil that evaluates the individual's symptoms, physical, social and psychological functions that include the arm, shoulder and hand. In addition, this questionnaire covers daily functions such as sweeping, combing hair, placing objects on shelves, among others, constituting common activities and present in everyday life[9,10].

However, although individuals with RMR present pain that may influence their functional activities, few studies have verified whether pain level affects shoulder function in the same way. Because of this, the study aimed to verify whether pain intensity correlates with upper limb function in subjects with RMR. The hypothesis of the study is that the higher the pain intensity, the greater the correlation with upper limb functional impairment, since individuals with RMR tend to have reduced shoulder function[11,12], negatively impacting functional activities[13,14].

METHODS

This is a cross-sectional observational study with a quantitative approach, conducted at the Clinical School of Physiotherapy of the University of Santa Catarina State (UDESC) in Florianópolis, Santa Catarina, Brazil, and at the Physioactive Clinic in Santa Maria, Rio Grande do Sul, Brazil. The research was approved by the UDESC Human Research Ethics Committee under CAAE nº 37088014000000118. All subjects signed the Informed Consent Form.

The process of selecting the research participants was intentional. Initially, an anamnesis form was applied to collect data pertinent to the research, such as age, gender, time of shoulder pain, among others. Next, a kinetic-functional evaluation was performed by a physical therapist to prove the injury. The evaluation consisted of 5 clinical tests, in which individuals should present a positive result in at least 3 of them, thus indicating signs of rotator cuff injury[15]. The tests were: 1) Positive Hawkins test; 2) Positive Neer test; 3) pain during active elevation lower than 60 degrees in the scapula plane; 4) Positive jobe test (empty mug); 5) pain or weakness with external shoulder rotation resisted with arm at side of body.

Afterwards, pain was evaluated by VAS. This scale consists of a 10 cm horizontal line with the number 0 (zero) marked at the left end of the line corresponding to no pain and the number 10 (ten) marked at the right end of the same line corresponding to the maximum pain[16]. Thus, the individuals marked a vertical line on the line to demarcate the pain level and the evaluator measured with a ruler from mark 0 to the line marked by the subjects.

Finally, the DASH questionnaire was applied. The questionnaire consists of 30 questions that evaluate symptoms and physical, social and psychological functions. Each question has 5 answer possibilities that vary between no difficulty and unable to perform the activity with a score from 1 to 5. The final score of the questionnaire ranges from 0 to 100: 1-20 (no limitation), 21-40 (mild limitation), 41-60 (moderate limitation), 61-80 (severe limitation) and 81-100 (very severe limitation). In addition, there are two modules with optional items: one for athletes and/or musicians and one for workers. The questionnaire score is calculated by applying established formulas, one used to analyze the first 30 questions and another used separately for optional modules[9,10].

The following inclusion criteria were adopted: clinical diagnosis of RMR; men and women; age range between 20 and 70 years old; have had pain for at least six months; undergo kinetic-functional evaluation; not using anti-inflammatory drugs for at least one month; not being in physical therapy treatment and presenting pain with intensity greater than three VAS[16].

Exclusion criteria were: subjects with clinical signs of complete rotator cuff injury (positive drop arm test); who had undergone shoulder surgery; painful complaint in the spine (thoracic region); history of surgery or trauma to the spine, pregnant women; history of cancer; neurological disease and visual and/or hearing impaired. Descriptive analysis was performed with mean and standard deviation, numerical presentation and percentage. To perform the correlation analysis between pain and DASH, the normality of the variables was tested using the Shapiro Wilk test. Since the pain variable did not present a normal distribution (p=0.0019), the Spearman correlation coefficient (rs) was

applied using a significance level of 5%. The coefficient strength considered the following values: between 0.00 and 0.25 small correlation; between 0.26 and 0.49 low correlation; between 0.50 and 0.69 moderate correlation; between 0.70 and 0.89 high correlation; and between 0.90 and 1.00 very high correlation[17]. Statistical analysis was performed using software R version 3.4.1.

RESULTS

The sample consisted of 60 individuals, 41 females and 19 males. Regarding the practice of physical exercise, 58.33% did not practice any physical exercise. Sample characteristics are shown in Table 1.

The shoulder that presented the greatest involvement was the right one, corresponding to 66.67%. Regarding pain, the average time the subjects had this symptom was 3.76 years. The level of pain verified by VAS was 5.02 cm (moderate).

The general data from the DASH questionnaire are presented in Table 2. The results regarding the distribution by sub-limitation are shown in Table 3.

Regarding pain and shoulder function (DASH), a low correlation was obtained (rs=0.2949), with p=0.0222. The joint behavior of these variables is shown in Figure 1.

DISCUSSION

The present study generally showed that the subjects had moderate pain and there was a weak correlation between pain and shoulder limitation. This fact was unexpected, as it was believed that pain would have the same effect on functional activities, a fact that did not occur, refuting the study hypothesis. Thus, it is suggested that this result may be justified by the fact that the subjects present local chronic pain (shoulder region).

Chronic pain is characterized by central sensitization reflecting pain that is largely driven by sensitization in the central nervous system and descending deficiency in pain modulation[18]. However, there are certain chronic pain conditions that are more localized in joints and central sensitization is not always present, such as in individuals with shoulder pain[19]. Thus, although the individuals in this study had chronic pain (average of 3.76 years), this was localized, and there was no reinforced nociceptive signaling, which possibly allowed the subjects to perform the functional tasks without major limitations and painful complaints.

In addition, another aspect verified in this research is in relation to the individuals who practice some physical exercise and/or sport, where they did not present limitation of the shoulder function. Research shows that both an increase and a decrease in pain threshold may occur in chronic pain patients when engaged in different types of exercise[20,21]. Therefore, as the present population presented chronic pain with localized complaint, apparently without dominant central sensitization, the exercise may have helped these subjects.

Table 1: Sample Features.

Variables	Subjects (n=60) Average±standard deviation
Age (years)	45.27±14.17
Height (m)	1.66±0.09
Weight (Kg)	74.23±14.63

Table 2: DASH (Disabilities of the Arm, Shoulder and Hand) Questionnaire Overall Rating.

DASH Questionnaire	30 Questions	Module 1 Physical exercise	Module 2 Work
Punctuation	34.43	11.82	35.38
Limitation	Light	No limitation	Light

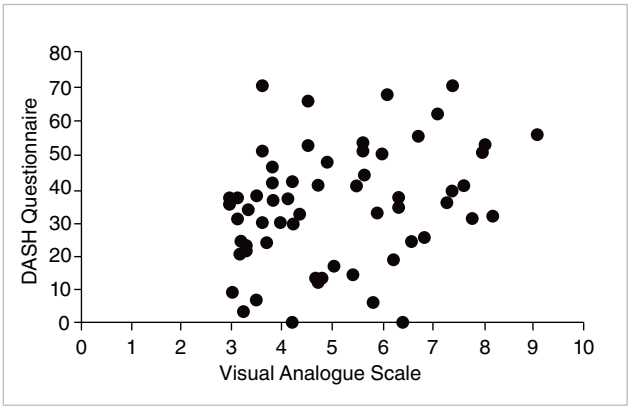

Figure 1: Dispersion between pain scale and DASH (Disabilities of the Arm, Shoulder and Hand Questionnaire) questionnaire.

Tabela 3: DASH (Disabilities of the Arm, Shoulder and Hand) Questionnaire classification on under-limitation.

DASH Questionnaire	30 Questions	Module 1 Physical exercise	Module 2 Work
No limitation	20% (n=12)	25% (n=15)	31.68% (n=19)
Light limitation	46.67% (n=28)	10% (n=6)	28.33% (n=17)
Moderate limitation	25% (n=15)	1.67% (n=1)	18.33% (n=11)
Severe limitation	8.33% (n=5)	1.67% (n=1)	18.33% (n=11)
Very severe limitation	0% (n=0)	3.33% (n=2)	3.33% (n=2)
Did not answer this item	-	58.33% (n=35)	-

*Did not practice physical exercise and/or sport

This possible benefit of exercise may have occurred because it appears that there is an endogenous pain inhibition mechanism that may be active during exercise, which results in increased pain threshold both during and after exercise[20-22]. Thus, the subjects become more tolerable to pain, not severely affecting their function.

However, it is noteworthy that this effect seems to be dependent on the patient and the type of exercise (general aerobic training or strength training, for example)[20,21]. Also, if the exercises are performed involving different parts of the body this can result in pain relief in these patients, reducing the sensitivity to pain in the affected tissues. On the other hand, it has been seen that specific exercises involving painful body parts do not always activate segmental or multisegmental inhibitory mechanisms of pain in patients with complaints of shoulder muscle pain, for example[20-22]. This aspect regarding the type of exercise, as well as whether these were general or local were not addressed by the research, constituting a limitation of the study.

Regarding the sample subjects, it was found that the individuals had a mean age of 45.27 years, most of them women. In this context, there are studies showing that complaints tend to increase with age[23] and women are more likely to have musculoskeletal disorders[24], as well as tend to have lower pain thresholds than men[25].

Other studies on subjects with RMR also used DASH to assess shoulder function, showing that this questionnaire can be used for both an initial assessment and for reevaluation of shoulder function after interventions and/or after a treatment period[26,27]. Similarly, other studies have used VAS to quantify pain in individuals with RMR[28]. Therefore, both the use of DASH and VAS is totally viable in clinical practice and it is proposed that its use should be encouraged, since both are easy to apply and understand, making it possible to follow the patient more objectively in the process. rehabilitation.

However, although the applicability of both instruments in the clinic is relevant, it is important to highlight that the physiotherapist may not always infer that the level of pain brings the same impairment in shoulder function, as was verified in this research, although the subjects had pain considered moderate, the degree of function limitation was considered mild.

It should be highlighted some limitations that were part of the research. The first refers to the absence of a sample calculation, which does not allow verifying the external validity of the study for populations with different characteristics. The second limitation refers to the sample consisting only of subjects with chronic pain with wide age variation, besides the use of only one instrument to verify pain, as well as shoulder function, not knowing if using another scale and/or another function questionnaire these results would be different. Finally, the absence of a diagnostic imaging exam associated with clinical tests, which could have provided greater accuracy to the diagnosis.

In conclusion, it was possible to verify that individuals with RMR presented moderate pain and there was a slight limitation in functional and work activities, without limitation in individuals who practiced some physical exercise. In addition, there was correlation, however, this correlation was weak between pain and shoulder function assessed by the DASH questionnaire. Therefore, the pain level was not reflected in the same proportion in shoulder function. It is suggested for further studies to include subjects with acute pain and / or subdivision of groups according to chronic pain duration, the addition of other instruments that evaluate pain and functional aspects of the shoulder, as well as to investigate the type of exercise that the subjects have. subjects practice (whether aerobic or strength), as well as their periodization.

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