



COMMUNITY PHYSICAL ACTIVITY: EFFECTS ON FUNCTIONALITY IN CHRONIC LOW BACK PAIN

Atividade física comunitária: efeitos sobre a funcionalidade na lombalgia crônica

Actividad física en la comunidad: efectos sobre la funcionalidad en la lumbalgia crónica

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ABSTRACT

Objective: To evaluate the pain intensity, lumbar strength and functionality of individuals presenting chronic non-specific low back pain and taking part in a public physical exercise program. **Methods:** Exploratory, cross-sectional and quantitative survey conducted in 2017 with 130 women from 30 to 60 years of age and without history of spinal surgery. The Oswestry Low Back Pain Disability Questionnaire (ODQ) was applied for assessment of the disability related to the lumbar spine. The pain was quantified through the visual analog scale (VAS) and the lumbar muscle strength through lumbar dynamometry (Takei®). **Results:** Of the 130 participants, 97.7% (n=127) presented minimal functional disability related to the lumbar spine (ODQ). In respect to strength, 16.9% (n=10) presented normal values and 83.1% (n=120) were below the reference values, presenting muscle weakness. As for the pain intensity, 47.7% (n=67) of the participants showed mild intensity, 45.5% (n=59) presented moderate intensity and 6.9% (n=9), severe. **Conclusion:** The program has characteristics that contribute to maintaining under control the pain intensity, which has been slight, as well as the significant functional disability of the individuals. The muscle weakness in the lumbar region, presented by the participants without association with functionality, and the pain as well, might be factors that perpetuate the chronic low back pain. The findings suggest the need to revise the therapeutic prescription of the exercises of the implemented program.

Descriptors: Low Back Pain; Health Promotion; Exercise.

RESUMO

Objetivo: Avaliar a intensidade dolorosa, a força lombar e a funcionalidade de indivíduos que possuem lombalgia crônica inespecífica e são praticantes de um programa público de exercícios físicos. **Métodos:** Pesquisa exploratória, transversal e quantitativa realizada em 2017, com 130 mulheres de 30 a 60 anos de idade e sem histórico de cirurgia na coluna vertebral. Aplicou-se o Oswestry Low Back Pain Disability Questionnaire (ODQ) para a avaliação da incapacidade relacionada à coluna lombar. Quantificou-se a dor através da escala visual analógica (EVA) e a força muscular lombar com dinamometria lombar (Takei®). **Resultados:** Das 130 participantes, 97,7% (n=127) apresentaram incapacidade funcional mínima relacionada à coluna lombar (ODQ). Em relação à força, 16,9% (n=10) apresentaram valores normais e 83,1% (n=120) abaixo dos valores de referência, apresentando fraqueza muscular. Quanto à intensidade da dor, 47,7% (n=67) das participantes apresentaram intensidade leve, 45,5% (n=59) apresentaram intensidade moderada e 6,9% (n=9), intensa. **Conclusão:** O programa possui características que contribuem para manter controlada a intensidade dolorosa, que vem se mostrando baixa, bem como a incapacidade funcional significativa dos indivíduos. A fraqueza muscular na região lombar, apresentada pelas participantes sem associação com a funcionalidade, e a dor podem ser um fator que perpetua os quadros de lombalgia crônica. Os achados sugerem a necessidade de revisão da prescrição terapêutica dos exercícios do programa realizado.

Descritores: Dor Lombar; Promoção da Saúde; Exercício.



RESUMEN

Objetivo: Evaluar la intensidad del dolor, la fuerza de la región lumbar y la funcionalidad de individuos que tienen lumbalgia crónica inespecífica y que participan de un programa público de ejercicios físicos. **Métodos:** Investigación exploratoria, transversal y cuantitativa realizada en 2017 con 130 mujeres entre 30 y 60 años de edad y sin histórico de cirugía de la columna vertebral. Se aplicó el Oswestry Low Back Pain Disability Questionnaire (ODQ) para evaluar la incapacidad relacionada con la región lumbar. Se cuantificó el dolor a través de la escala visual analógica (EVA) y la fuerza muscular de la región lumbar con la dinamometría (Takei®). **Resultados:** De las 130 participantes, el 97,7% (n=127) presentaron incapacidad funcional mínima relacionada con la región lumbar (ODQ). Respecto la fuerza el 16,9% (n=10) presentaron valores normales y el 83,1% (n=120) presentaron valores por debajo de los de referencia señalando debilidad muscular. Cuanto la intensidad del dolor el 47,7% (n=67) de las participantes presentaron intensidad leve, el 45,5% (n=59) intensidad moderada y el 6,9% (n=9) intensa. **Conclusión:** El programa tiene características que contribuyen para el mantenimiento de la intensidad del dolor que se presenta baja así como la incapacidad funcional significativa de los individuos. La debilidad muscular de la región lumbar presentada por las participantes sin asociación con la funcionalidad y el dolor pueden ser un factor que se presenta en los cuadros de lumbalgia crónica. Los hallazgos sugieren la necesidad de revisión de la prescripción terapéutica de los ejercicios del programa realizado.

Descriptor: Dolor de la Región Lumbar; Promoción de la Salud; Ejercicio.

INTRODUCTION

The theme of health promotion was given a boost after political changes in the country in the 1980s, when the concept of quality of life began to gain importance, parallel to the subsequent approval of the Organic Health Law (1990) and the creation of the Brazilian Unified Health System (SUS), whose main objective is to ensure everyone the right to health, with the State as the organ to arrange such benefit^(1,2).

Functional health is the state of functionality and well-being, individual and collective, in the performance of activities and in social participation, in which quality of life and autonomy are promoted for the full exercise of citizenship⁽³⁾. An important determinant for adherence, or not, in health promotion events is the participation of the population^(4,5).

Strong evidence shows that physical inactivity increases the risk of many adverse health conditions, which causes a decrease in life expectancy. Physical inactivity accounts for about 5.3 million deaths worldwide each year, generating a total percentage of 10% of all deaths that have occurred and is therefore a major threat to the health of the entire population⁽⁶⁾. Low back pain is among the disorders associated with inactivity, as a morbidity with a high degree of prevalence in the population, reaching 70%^(7,8).

Low back pain is characterized as a pain in the final part of the spine, between the last ribs and the beginning of the gluteal line. Most cases can be classified as chronic when the symptom persists for more than twelve weeks and has a non-specific origin, and its main cause is not known⁽⁹⁾. It can be related to a number of causes, from the posture adopted at work and in work activities up to degenerative diseases and muscular disorders. Its main reports are increased pain at the end of the day due to muscle fatigue in the region^(9,10).

The low level or lack of physical activity is one of the factors that may be leading to the onset of non-specific chronic low back pain, being associated with the functionality and/or disuse of the lumbar musculature⁽¹¹⁾. In the general population, the practice of physical activity reduces lumbar pain⁽¹²⁾.

Although the specific cause of most chronic low back pain is difficult to determine, this is known to be associated with lifestyle and, regarded as some of the potential risk factors are sedentary lifestyle, being overweight and prolonged stay in certain positions⁽¹³⁾. Loss of muscle strength and flexibility are aspects related to low back pain. These symptoms are common when the individual features shortening of the iliotibial band and hamstring muscles, as well as weakness of abdominal and spinal erectors muscles⁽¹⁴⁾.

Therapeutic exercises for low back pain can be performed in group or individually, with several physical and functional goals and comprising aerobic activity, in addition to strengthening, stretching, and segmental and global postural therapies⁽¹⁵⁻¹⁸⁾.

The aim of the study is to evaluate the pain intensity, lumbar strength, and functionality of individuals presenting non-specific chronic low back pain and taking part in a public physical exercise program.

METHODS

Exploratory, cross-sectional and quantitative survey was conducted in community centers in the city of Criciúma, in the state of Santa Catarina, Brazil, totaling 12 neighborhoods, which join the program named *Ritmo e Saúde* (meaning Rythm and Health) of the Criciúma Women's Social Service Association (*Associação Feminina de Assistência Social de Criciúma - AFASC*).

The population involved is composed of 400 program participants distributed in the 12 units. After performing the sample calculation, considering a sample error of 8% and a confidence level of 95%, a minimum target sample of 110 participants was established. The actual sample totaled 130 participants in the program, with voluntary and consented participation in the study.

Data collection took place in March and April 2017, at nighttime, with the help of scholarship recipients from the Laboratory of Biomechanics (Labiomec) of the Extremo Sul Catarinense University (UNESC). The students received training involving the use of the visual analogue scale (VAS) and the positioning of the lumbar dynamometer, with standardization of the strength evaluation and the application of the Oswestry Low Back Pain Disability Questionnaire (ODQ).

Ritmo e Saúde program offers muscle strength and endurance exercises, kinesiotherapeutic exercises performed on mats, aerobic exercises such as functional training, supervised walking and zumba sessions, prescribed by professionals with the assistance of academic trainees of Physical Education and Physiotherapy undergraduate programs.

Inclusion criteria for this research involved women aged 30 to 60 years, participating in the program for at least three months, and attending the activities at least twice a week. Women with a history of lumbar spine surgical procedure were excluded. Even though low back pain is not one of the factors that lead the participants of the present study to adherence to *Ritmo e Saúde* program, all participants presented low back pain at some time within the last year.

A direct and structured interview and physical-functional assessments of the lumbar spine were performed, with use of instruments of disability and lumbar dynamometry, as well as an interview, which collected identification data such as name, age, sex and profession.

In order to assess the level of capacity and disability related to the lumbar spine of the program participants, the Oswestry Low Back Pain Disability Questionnaire (ODQ)⁽¹⁹⁾ was applied, which consists of 10 sections, each one with six statements, where 5 is the total score. In case the first affirmative is chosen by the respondent, the section score is zero (0) and, if the last one is chosen, five (5) points.

The pain intensity was evaluated by the visual analogue scale (VAS), which considers a 0-to-10 scale, where zero (0) means the total absence of pain and ten (10) is the maximum pain level that a person can bear⁽²⁰⁾.

The Nordic Musculoskeletal Questionnaire (NMQ) was used for the other bodily dysfunctions. The NMQ consists of a body map subdivided into areas of the human body: neck; shoulders; elbows; forearms; fists; hands and fingers; upper back; low back; hips and/or thighs; knees; ankles and/or feet. It is divided into three columns, which present the following questions: 1) Considering the last 12 months, have you had any problems (such as pain, discomfort or numbness) in the following areas? 2) Have you had any problems, in the last 7 days, in the following areas? 3) During the last 12 months, did you have to avoid your normal activities (work, household chores or hobby) because of problems in the following areas?

Lumbar muscle strength was assessed using the Takei® lumbar dynamometer, with a measurement scale of 0 to 200 kilograms-force (kgf). For that, the subjects were placed in orthostatic posture on the base of the dynamometer, with their feet supported on the device, extended knees, flexed trunk and with both hands gripping the handles. One forearm was in supinated position and the other in pronated position. They were then given the command to start pulling the stick upward, using the strength of the lumbar muscles to extend the torso. In lumbar dynamometry, some verbal commands were needed, such as: “be on position!, ready!, pull!, and strength!”.

The test was performed three times, always picking the highest value obtained in each dynamometry for each participant. Finally, a retrospective questionnaire on lumbar dysfunctions was applied, containing 20 questions, in which the answer was based on options from 1 to 5 (1: no pain, 2: mild pain, 3: moderate pain, 4: strong pain, 5: severe pain). After data collection, the data were tabulated in the Statistical Package for Social Sciences - SPSS, version 22.0, with the consequent analysis.

The participants were informed about the research objectives and methods, and then invited to participate, and the signing of the Informed Consent Form (ICF) was requested. The invitation of the volunteers and the obtaining of the data occurred after the approval of the project by the Research Ethics Committee of UNESC, under Approval No. 1 993 071.

RESULTS

In total, 130 female participants in the *AFASC Ritmo e Saúde* program made up the sample of the present study. Instead of 110, the sample size was increased to 130 participants because of the availability, willingness, and curiosity regarding the research.

The mean age was 48.82 years, with a standard deviation of ± 8.44 years. The minimum age was 31 years, and the maximum was 60 years. Lumbar dynamometry presented 11 kgf as the lowest result and a maximum value of 91 kgf, generating a mean of 54.35, with a standard deviation of ± 16.32 kgf. These individual results, when compared to age and sex in the reference table, showed that only 16.9% (n=10) of the 130 participants had normal strength level. Therefore, 83.1% (n=120) of the participants reached values below normality, denoting muscular weakness.

The mean visual analogue scale (VAS) scores found are 2.99, with a standard deviation of ± 2.79 , where the minimum value found is 0 and the maximum is 10 on the scale. By having the VAS divided into intensity bands, it can be seen that the majority of the participants present pain of minimal intensity, followed by moderate and severe pain.

The results presented by the retrospective questionnaire on low back function and pain presented a higher percentage involving questions 12, 17 and 20, as observed in Table II.

Table I - Visual analogue scale of women with chronic non-specific low back pain participating in a public physical exercise program in Criciúma, Santa Catarina, Brazil, 2017.

Variables	Mean \pm Standard deviation or n (%) n = 130
VAS	
Minimum	47.7% (n=62)
Moderate	45.4% (n=59)
Severe	6.9% (n=9)

VAS: visual analogue scale, n: number of respondents.

Table II - Distribution according to pain characteristics and previous functional impacts in women with chronic non-specific low back pain participating in a public physical exercise in Criciúma, Santa Catarina, Brazil, 2017.

	Pain intensity (%)				
	None	Mild	Moderate	Strong	Unbearable
Q12	53.1%	12.3%	22.3%	11.5%	0.8%
Q17	50.0%	13.8%	20.8%	13.1%	2.3%
Q20	80.0%	11.5%	4.6%	3.9%	0.0%

Responses to the Retrospective Questionnaire on Low Back Function and Pain. Q12 - If pain appeared during the performance of functions at work; Q17 - If pain was felt at the end of the day; Q20 If there was pain while resting.

The results presented by the ODQ indicate that: 97.7% (n=127) of the participants presented a minimal degree of functional disability; 2.3% (n=3) of them present moderate degree of functional disability. None of the participants presented severe functional disability at that time (Table III). When comparing the ODQ to the NMQ, it was identified that, within the past 12 months, 51.5% (n=67) of the women presented some type of pain in the lumbar region and 16.9% (n=22) were prevented from doing their chores because of the pain.

Table III - Oswestry Low Back Pain Disability Questionnaire (ODQ) 2.0 / Nordic Musculoskeletal Questionnaire (NMQ) of women with chronic non-specific low back pain participating in a public physical exercise program in Criciúma, Santa Catarina, Brazil, 2017.

Variables	Mean \pm standard deviation or n (%) n = 130
ODQ 2.0	
Minimum	97.7%
Moderate	2.3%
Severe	0.0%
NMQ	
Pain within the last 12 months	51.5%*
Pain within the last 7 days	30.0%*
Withdrawal from activities within the last 12 months	16.9%*

Legend: *The values distribute the percentage of the total per independently explored topic, that is, the percentage that presented pain within the last 12 months, the percentage that presented low back pain in the last 7 days, as well as the percentage presenting withdrawal from their activities within the last 12 days.

DISCUSSION

Low back pain is a quite frequent musculoskeletal disorder with the potential to lead to functional disability because of its strong impact on quality of life, social levels of participation and activity⁽²¹⁾, which is why it is taken as the subject matter of investigation.

Pain is a multidimensional, complex, individual and subjective experience, and its chronification⁽²²⁾, despite presenting a tendency to reduce intensity (as observed in the present study), can generate physical-functional adaptations, such as weakness of the muscles involved in the lumbar vertebrae segment.

In this sense, the results of the current study, with 93.1% of the volunteers presenting minimal to moderate pain intensity, are dissociated from the occupational functions and the time of the day. Such findings, associated with that of 83% of volunteers with a significant reduction of muscle strength, contribute to characterize these cases of chronic low back pain.

When considering the period in which the pain persists, that is, its duration, it is possible to classify it as acute, subacute or chronic, characterizing its staging. Acute pain is associated with injury. It has a short duration and tends to disappear as the injury heals. Chronic pain is persistent, recurrent and not necessarily associated with an injury to the body. Pain chronification may be of unknown causes. In their classification, those remaining for more than three months are considered chronic, which is the case of painful syndromes, such as non-specific chronic low back pain⁽²³⁾.

In the present study, it was observed that all participants felt pain in the low back area at anytime in their life, and the pain may be associated with sedentary lifestyle, bad posture in the work environment, muscle weakness in the lumbar region or erroneous execution of the exercises prescribed in the program.

A study of low back pain that sought to demystify its origin has led to the hypothesis that non-specific chronic low back pain may be directly linked to non-recruitment, or less recruitment, of the fibers of the lumbar spine stabilizing muscles, such as the transverse abdominis muscle, and the deep fibers of the multifidus muscle. With this, its treatment becomes complex, not limited only to the strengthening of the lumbar muscles. On the contrary, one must think of the patient as a whole person⁽²⁴⁾.

In a cross-sectional study aimed at evaluating musculoskeletal symptoms in active and sedentary adults, with 49 participants, all aged over 47 years and of both sexes, predominantly women, were found to have 29 active individuals and 20 sedentary ones. The result is that, during the last twelve months, the active subjects presented 10% of painful complaints, while the sedentary ones, 45%. As to the last seven days, the painful complaints are of 7% in the active ones and of 40% in the sedentary ones. This reveals that chronic pain becomes more common in sedentary individuals⁽²⁵⁾.

One study reports that decreased muscle strength may lead to reduced autonomy in performing exercises or activities of daily living (ADL). Moreover, muscle deficit may be related to functional limitation, morbidity and mortality, regardless of age. Therefore, the quantification of muscle strength is indispensable for comparison of other factors related to low back pain^(26,27).

Even though non-specific chronic low back pain is present in the volunteers of the present study, the disability found is regarded as low, and is shown to be disconnected from the presence of pain. Maintaining activity in a community program with diversification of exercise types contributes to this response and low levels of pain intensity as well.

One study separated into two groups 40 women who had chronic low back pain, in the age range of 30 to 50 years, in which one performed lumbar segmental stabilization exercises, and the other performed the same exercises, in association with gluteal strengthening exercises for six weeks. A more expressive effect was observed in the individuals who performed lumbar segment stabilization exercises associated with gluteal strengthening^(21,28).

The absence of physical activity practice is a variable that may show association with disability. Studies evaluating individuals with low back pain have identified that pain is associated with lower levels of physical activity^(28,29). Similarly, other study showed a relationship between disability and level of aerobic activity in patients with chronic low back pain, in which low back pain was reduced in these individuals in relation to the controls⁽³⁰⁾. Another study showed that moderate aerobic exercise performed three times a week by people with non-specific chronic low back pain is able to reduce painful symptoms, reduce biochemical mediators related to the pathophysiology of musculoskeletal pain, such as creatine kinase, and oxidative stress parameters⁽²³⁾.

A review study has shown that exercise has reductive effects on low back pain and, as a consequence, generates increased levels of functionality. Exercises that aim at endurance, muscular strengthening, postural control and stretching can serve not only as a proposed treatment for low back pain, but also as a form of prevention. Such practice can be performed individually or in a group⁽³¹⁾.

Much of the effects induced by physical exercise, such as increasing muscle mass, improving the cardiovascular system, reducing the incidence of disease, and releasing endogenous opioids, such as beta-endorphins, are mainly due to induced adaptations of the various bodily systems for the improvement of their physiological efficiency⁽³²⁾.

Similarly, another study showed a relationship between disability and level of aerobic activity in patients with chronic low back pain, which was found reduced in these individuals in relation to the controls⁽³⁰⁾.

One should consider that, for a long time, taking a rest cure has been recommended in cases of chronic low back pain but, more recently, it is known that regularly practiced physical exercise decreases lumbar pain events⁽²³⁾.

Among the limitations of the present study is the lack of information on the participants prior to the program, highlighting the importance of recording general health information at the beginning of community programs.

CONCLUSION

The program has characteristics that contribute to keeping pain intensity under control, and its intensity has been shown to be low, as well as the significant functional disability of the participants. Lumbar muscle weakness, presented by the participants with no association with functionality, and the pain may be a factor that perpetuates chronic low back pain. The findings suggest the need for reviewing the therapeutic prescription of the program performed.

CONFLICTS OF INTEREST

There is no conflict of interest involving this study.

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