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EC PSYCHOLOGY AND PSYCHIATRY
Research Article

Evaluation of Isostretching for Reduction of Musculoskeletal Pain and Improvement of University Community Flexibility

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Received: March 20, 2021; **Published:** April 26, 2021

Abstract

Justification: Several activities in the globalized world, including those developed in the university community, caused musculoskeletal discomfort in workers and students. The Isostretching method has proven to be an effective strategy, reducing musculoskeletal pain and increasing muscle flexibility.

Objective: To evaluate the effect of Isostretching in reducing complaints of musculoskeletal pain and in improving muscle flexibility in workers and students of a public higher education institution.

Method: Quasi-experimental intervention research with quantitative and comparative analysis. For the collection, a characterization questionnaire, Corlett Diagram, and the well bank test were used to assess flexibility. Data collection was divided into three stages: the first consisted of questionnaires and a flexibility test; the second, the isostretching intervention; the third, the application of questionnaires and the flexibility test.

Results: There was no significant reduction in pain in several musculoskeletal segments after ($p > 0.05$). In the assessment of muscle flexibility, there was an increase in flexibility in the participants ($p = 0.012$).

Conclusion: Stretching showed significance to increase the participants' muscular flexibility, however, there was no significant reduction in musculoskeletal pain. Therefore, it is suggested to apply a method in the academic environment, to promote a better quality of life for workers and students.

Keywords: *Musculoskeletal Pain; Worker's Health; Worker; Universities; Students*

Introduction

Advances in technological innovations provide several benefits, as well as cause health problems for workers and the community at large. The intense changes of the globalized world can bring about major changes in lifestyle, but also in people's work and study environment [1].

Many of the work activities, including those developed in the academy, require workers and students to stay in inadequate postures, perform repetitive and monotonous tasks, perform work in excessive numbers of hours and with absence of breaks, the collection and pressure of managers, teachers, among others. These factors facilitate the presence of occupational risks that can lead to changes in musculoskeletal structures, such as reduced flexibility and the onset of Work-Related Musculoskeletal Disorder (WMSDs), which can most often lead to the causes of incapacity and removal of workers from their daily activities [2].

Epidemiologically, WMSDs it is classified as the second most prevalent cause of disease among Brazilian workers. It is caused by repetitive movements performed daily, related to the temporality of these recurrences caused by the form of work organization [1]. This type of injury is not a specific clinical entity. Covers several symptomatic conditions such as inflammation of the tendons and the like (tenosynovitis, epicondylitis, bursitis), nerve compression (carpal tunnel syndrome, sciatica) and osteoarthrosis, in addition to other painful conditions such as myalgia, low back pain and other regional painful syndromes [3].

Musculoskeletal pain is associated with repetitive movements after a certain period, hindering work performance and establishing a process of muscle and mental fatigue. Consequently, this condition favors the appearance of inadequate postures that affect blood circulation, leading to a malfunction of the nervous and musculoskeletal system [4].

However, the lack of muscle flexibility is considered a relevant factor as a cause of pain. Muscle flexibility can be considered as an essential part of physical fitness, because it is from it that the ability of one or more joints to move in a good range of motion is obtained without muscle strains or pain, thus improving postural quality, in the individual's personal and professional life [5].

One of the possibilities for improving flexibility is the performance of a physiotherapeutic intervention with the use of the Isostretching method. This method of postural exercise emphasizes the strengthening of deep muscles through isometric contraction, stimulates body awareness and the acquisition of a good physical condition [6].

This technique is performed through self-aggrandizement of the spine and respiratory control, with the maintenance of upright posture and prolonged breathing, at the end releasing the expiration without modifying the posture and lengthening the spine, lower and upper limbs. Isostretching works the body globally with each exercise. Respiratory control is the basis and aggregates muscle work in order to promote improvement in flexibility, strength, pain s for weakness, posture and among other benefits [6].

With the improvement of flexibility and symptoms of WMSDS, this technique facilitates the reduction of spinal tensions, disabilities and algias, the improvement of agility and body perception, respiratory functions, general physical conditioning, in addition to increasing the resistance of abdominal muscles, trunk extensors and gluteus maximus and favoring the performance and performance of daily activities and professional tasks [7]. In view of this, the Isostretching method may constitute an intervention, both preventive and rehabilitative, for the reduction of musculoskeletal pain and the improvement of flexibility.

In view of the above, the need to know the effectiveness of Isostretching for reducing pain and improving health, as well as preventing occupational diseases in workers and students, is justified. In addition, the study may contribute to the production of scientific knowledge, since the number of studies that addressed this topic are reduced.

Objective of the Study

The objective of this study was to evaluate the use of the Isostretching method to reduce complaints of musculoskeletal pain and to improve muscle flexibility in workers and students of a public institution of higher education.

Materials and Methods

Nearly-experimental, interventional design research, with quantitative and comparative approach of data, developed in a Public Institution of Higher Education (PIE), aimed at teaching health professionals.

The study population consisted of 58 participants, including teachers, administrative technicians and students, who were interested in participating in the study. All were invited to participate in the study, however, only 19 fully complied with the proposed activity at all stages, this being the final sample.

Thus, the following were included in the study: teachers and technical-administrative workers with a minimum institutional time of one year, undergraduate students enrolled in the second year of the course; without physical impediment to participate in activities during data collection, not being on sick leave, maternity leave, not being in gestational period, not being physically disabled or even without being in physical therapy treatment for pain symptoms.

Because it is a nearly-experimental, interventional and comparative study, this design allows a reduction in the variability of the measurements, increasing the comparability of individuals, reducing the numerical need for sample for the detection of a phenomenon, especially when the individual is submitted to measures of comparison of an intervention [8].

After the following criteria, a list of these participants was made with dates and times for the beginning of data collection. The physiotherapeutic intervention with the use of the isostretching method was planned to happen twice a week, for two sequential months.

On the first day, scheduled for this intervention, before its realization, two questionnaires were applied to the participants, which were delivered to the participants so that they could answer them individually: questionnaire of Characterization of the Subjects, to obtain information about the population studied, of a multidimensional character, with open and closed questions that addressed personal data, life and health habits and occupational data and occupational data.

Another instrument used was the Corlett Diagram (CD), used to assess the presence, location and intensity of musculoskeletal pain complaints. This instrument was validated and adapted for use in Brazil; presents an illustrative figure of the human body, showing in a schematic way the anatomical regions to be analyzed (neck, cervical, shoulders, upper and lower back, arms, forearms, elbows, wrists, hands, hip/thighs, knees, ankles and feet). It consists of 27 multiple choice questions, each of which represents a body segment (right, left or central hemisipus, when it comes to the spine). The degree of assessment of discomfort is evaluated from 1 to 5, being 1 for no discomfort or pain and 5 for an intolerable discomfort or pain [9,10].

To assess the level of muscle flexibility of the participants, the Wells Bank was used, also termed by "sit and reach test". This equipment consists of a wooden box measuring 30,5 cm x 30,5 cm x 30,5 cm, with an extension of 23 cm for the support of the upper limbs of the subjects. On the upper face of the chest and extender, there is a metric scale of 50 cm that allows to determine the reach of the individual. It is used to measure the elongation of the posterior part of the trunk and lower limbs [11].

To perform the flexibility test at the Wells Bank, participants were instructed to wear comfortable clothing and, at the time of the test, stand barefoot, sit facing the base of the box, with the lower limbs extended and in adduction. With one hand on the other and taking

the upper limbs horizontally, they were asked to tilt the body forward and reach with the fingertips of the hands as far as possible on the graduated ruler, without flexing the knees and without using swing movements.

Each of the participants made two attempts. A professional, trained in physiotherapy, remained at the side of the subject evaluated, keeping his knees in extension. The description of the test result was measured from the farthest position reached with the scalimeter and the best result was recorded between the two executions with annotation, in centimeters, in a decimal place [12].

After this step, the intervention program was started using the Isostretching method. The intervention lasted for two months, March and April 2016. Despite starting with 58 participants, over the course of the weeks, only 19 of them finished it. The 19 subjects were submitted to 16 isostretching sessions, twice a week lasting 30 minutes each session. Realized the activity in maximum groups of five to twelve people per session.

In each session, Isostretching exercises were performed, according to a protocol previously tested [13]. The sequence was as follows: the participant remained in ventral decubitus, in a sitting position and standing. The exercises were composed of three repetitions of six series and another by three repetitions of three series and, in each performance, it was necessary to promote prolonged expiration and the removal of the origin and insertion of the posterior chain musculature of the body (upper trapezoid muscle, scapula lift, suboccipitals, spine erectors, gluteus maximus, hamstrings, sural triceps and intrinsic foot muscles).

The room where the exercises were performed was also air-conditioned for all subjects, respecting the temperature of 23°C to 25°C, avoiding a very cold environment, which could prevent the benefit of muscle relaxation and also very hot, which would be unpleasant and uncomfortable while performing the exercises.

During the sessions, the exercises were verbally explained and demonstrated by the physiotherapist, so that there was a better understanding of the movements and after that the participants performed them under physiotherapeutic supervision.

After the 16 sessions performed in the Physiotherapeutic Intervention with the Isostretching method, the participants answered the questionnaires again and re-performed the flexibility test with the Wells Bank, allowing a comparison of the situations between the pre and post test.

After the data were collected, they were tabulated, and a database was drawn up. Subsequently, they were analyzed using the Statistical Package for the Social Sciences Program (SPSS), Version 19.0. Data on sample characterization, pain assessment and flexibility were treated using descriptive statistics.

Data on musculoskeletal pain symptoms were compared before and after the intervention, using the Schapiro-Wilk Test, to verify the normality of the sample means of each variable. In case of normality, the paired t-test was used. In the case of abnormality of the samples, significance analysis was performed using the Wilcoxon Test.

In the analysis of the values related to muscle flexibility in the pre and post-test, the difference between the values obtained from the post and the pre-intervention was calculated, in order to verify the actual value of increase and, consequently, improvement of flexibility. After, for the verification of normality and significance, the same criteria previously presented were adopted. In all tests, $p < 0.05$ values were considered statistically significant.

In accordance with the recommendations of Resolution 466/2012 of the Ministry of Health, that deals with research involving human beings, this study was approved by the Research Ethics Committee of EERP, as CAAE 45417115.9.0000.5393.

Results

Regarding the occupational characterization of the 19 participants, all were sedentary and healthy, aged between 19 and 63 years and without physical hindrance to participate in the activity during data collection. They were teachers (22.2%), employees (77.7%) and students from the institution (22.2%), most of them female (77.7%).

Table 1 presents the analysis of musculoskeletal pain of the participants, according to Corlet's diagram before and after the intervention by the Isostretching method.

Analysis	Pre-test	Post test
	Right Upper Limb	
Average	1,2	1,2
Medium	1,0	1,0
Standard Deviation	0,4	0,5
Minimum	1,0	1,0
Maximum	2,2	2,8
	Upper Left Limb	
Average	1,1	1,1
Medium	1,0	1,0
Standard Deviation	0,2	0,3
Minimum	1,0	1,0
Maximum	1,8	2,0
	Right Lower Limb	
Average	1,4	1,4
Medium	1,2	1,2
Standard Deviation	0,5	0,5
Minimum	1,0	1,0
Maximum	2,6	3,0
	Left Lower Limb	
Average	1,3	1,2
Medium	1,2	1,0
Standard Deviation	0,3	0,3
Minimum	1,0	1,0
Maximum	2,2	2,0
	Spine	
Average	1,9	1,7
Medium	1,8	1,5
Standard Deviation	0,9	0,7
Minimum	1,0	1,00
Maximum	5,0	3,70

Table 1: *Analysis of musculoskeletal pain in participants according to the Corlett diagram, before and after the intervention. Ribeirão Preto, SP, 2016, (n = 19).*

Regarding the alteration of musculoskeletal pain in the pre and post test, the Wilcoxon test showed no significant differences when comparing the values of the scores per segment: right upper limb pre and post-test: shoulder, arm, elbow, forearm, wrist, hand (p = 0,953); left upper limb pre and post-test: shoulder, arm, elbow, forearm, wrist, hand (p = 0,396); right lower limb pre and post-test: thigh, knee, leg, ankle, foot (p = 0,717); left lower limb pre and post-test: thigh, knee, leg, ankle, foot (p = 0,164) and pre and post-test spine: neck, cervical region, upper back, middle back, lower back, pelvis (p = 0,102). Thus, it can be affirmed that there was no reduction in pain symptoms in all segments evaluated.

Table 2 presents the evaluation of participants according to the levels of flexibility before and after the Isostretching method.

Flexibility levels	
Pre-test	**Post-test**
22	24
36,5	37
32,5	32,5
19,5	20,5
31	34,5
22	31,5
19,5	23
38	38,5
24	30,5

Table 2: *Individual assessment of the flexibility levels of participants in the Pre and Post-Wells Bank Tests. Ribeirão Preto, SP, 2016, (n = 19).*

It was verified that the muscular flexibility of the subjects ranged from 19.5 cm to 38 cm in the pre-test and from 23 cm to 38.5 cm in the post-test, demonstrating an increase in flexibility levels.

The descriptive statistics of muscle flexibility levels before and after the Isostretching method are presented in table 3.

Analysis	Pre-test	Post-test
Average	27,2	30,2
Medium	24,0	31,5
Standard Deviation	7,31	6,37
Minimum	19,5	20,5
Maximum	38,0	38,5

Table 3*: Descriptive statistics of muscle flexibility levels before and after test. Ribeirão Preto, SP, 2016, (n = 19).*

According to data presented in table 3, it was possible to notice that there was an increase in the mean levels and in the median flexibility (p = 0.012) in the participants of this study.

Discussion

At university there is a surprising dynamicity in the triad teaching, research and extension. In general, such activities take place at an accelerated pace, causing numerous academic meetings, publication of articles, investigations produced with or without funding, undergraduate and graduate education, practical activities, among others. This list of activities ends up causing physical and mental fatigue, with the presence of stressful situations, not always easy to face, which can favor illnesses and commitment in the quality of life of people who pass through it.

Complaints of varied pain are common in the University. One study estimated the prevalence of musculoskeletal pain in teachers, evaluating its occurrence according to sociodemographic aspects, general health and well-being at work of 525 teachers who answered a self-administered questionnaire covering such aspects. The overall prevalence of musculoskeletal pain was 73.5% and the most frequent were found in the shoulders (31,6%), top of back (27,8%), neck (27,2%) and ankles and/or feet (24,0%). Circulatory and respiratory problems and common mental disorders were associated with musculoskeletal pain. Well-being at work was associated with pain in the segments indicated [14].

Another study aimed to verify the prevalence of pain associated with the transportation of school supplies by university students, in which 373 university students were evaluated between February and September 2012. There was a high prevalence of pain related to the transportation of school supplies and the predictive influence of variables such as relative weight of the transported load and transport time of this material, especially in females [5].

A study that sought to investigate, describe and correlate musculoskeletal symptoms and the work capacity of the employees of a Public University of Minas Gerais, with 213 professors, 188 administrative technicians and 124 outsourced employees, showed that most teachers had good job capacity 47,9% (n=102). Among administrative technicians and outsourced employees, great capacity predominated with 43,6% (n=82 Technical) and 51,61% (n = 68 Outsourced). The regions most affected by pain among teachers and administrative technicians were the neck/cervical region 36,15% (n = 77 Teachers) and 28,19% (n=53 Technical). On the other hand, the lumbar region was the one that stood out among the outsourced as the main source of pain, 23,28% (n = 29). It was concluded that the presence of pain interferes with the work capacity of the individual, regardless of the affected region. It is suggested a preventive work, with an approach in the physical and mental aspects of the work activity, aiming at the maintenance or improvement of the indexes found [15].

One of the ways to minimize painful symptoms is the Isostretching technique, which, however, is still particularly new in Brazil and has been disseminated in specialization courses, clinical and among physiotherapy professionals [12,13,16].

In the face of the evaluation of the participants' muscle flexibility before and after the Isostretching intervention, it was found that there was a statistically significant increase ($p = 0.012$) of flexibility in the subjects evaluated. The results obtained coincide with other investigations in which Isostretching favored the improvement of muscle flexibility, suggesting that this technique increased the overall flexibility, and may be related to the increase in extensibility of the muscles of the posterior chain [17,18].

The lack of muscle flexibility is considered a relevant factor for pain. Muscle flexibility can be considered as an essential part of physical fitness, as it is from it that the ability of one or more joints to move in a good range of motion is obtained without muscle strains or pain, thus improving postural quality in the personal and professional life of the individual [19].

Study on the effects of Isostretching on the reduction of complaints of musculoskeletal pain, fatigue and improvement of flexibility in public employees, carried out with 25 non-teaching workers of a Public Institution of Higher Education in Health, the intervention was performed twice a week, lasting 30 minutes each, in the period of 10 weeks. The authors concluded that the Isostretching exercise protocol applied to participants was effective in reducing musculoskeletal pain in segments of the spine and upper limb, reducing fatigue levels

and improving muscle flexibility [13].

An investigation analyzed changes in muscle strength, flexibility, function and pain in people with chronic low back pain submitted to Global Postural Reeducation (GPR) and Isostretching in 39 patients aged 40 to 59 years. Patients were evaluated before and after treatment protocols for flexibility, functional capacity and pain intensity. With this, it was evidenced that both groups had effective improvements in muscle strength, flexibility, pain and functional capacity [20].

The Isostretching method aims to increase extensibility, strengthen muscles globally and realign vertebrae through postures maintained by isometric and/or eccentric contractions in extreme bands [21]. A significant improvement in low back pain was evidenced in an investigation among participants during treatment with Isostretching [18]. An assessment of flexibility in sedentary women through the practice of the Isostretching method, with 12 participants aged between 30 and 60 years, who performed 10 Isostretching visits, 2 times weekly, lasting 1 hour, concluded that Isostretching improved flexibility [16].

In a study that used individual interventions to support the healthy lifestyle in English nursing students, it was observed that such interventions were insufficient to motivate them. With this, they affirmed that this support should be incorporated into curriculum training, with future interventions to evaluate its effectiveness [22]. However, in a study conducted with 557 employees of a Spanish university, it was identified that physical activity can influence mental well-being and productivity at work. Thus, the authors suggested the practice of physical activity at work, to improve the well-being and productivity of the worker [23].

In view of the above, Isostretching has been shown to be effective in improving flexibility and reducing musculoskeletal pain in several studies. However, it did not obtain statistically significant results for the reduction of musculoskeletal pain in the participants of this investigation. It is assumed that this fact happened, perhaps, due to the duration of the sessions, the period of applications and the difficulty of keeping the volunteers with the commitment to follow the intervention correctly until the end and even by the measurement instruments.

The study has limitations, particularly related to the small sample size, because the participants did not attend the same number of sessions, which caused them to be eliminated. However, because it is a nearly-experimental and interventional study, the final sample was able to represent important results for study analysis and comparison before and after isostretching intervention.

Conclusion

According to the present study, it was not possible to show the efficacy of the Isostretching method in reducing musculoskeletal pain, but showed improvement in muscle flexibility.

Therefore, the possibility of using the Isostretching method for the treatment and improvement of musculoskeletal pain in workers and students cannot be ruled out, since several studies have pointed out such statistical significance, proven in several populations.

Therefore, further studies should be conducted with larger samples in order to verify the efficacy of this method in reducing musculoskeletal pain and improving muscle flexibility in members of the University. This is to prove the effectiveness and to verify the effect of this method by increasing the number of sessions or longer duration of the sessions.

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