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Sustainable health in the workplace: active breaks for musculoskeletal symptom management

Saúde sustentável no local de trabalho: pausas ativas para gestão de sintomas musculoesqueléticos

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ABSTRACT

Background: The working day entails a lot of downtime, causing slight discomfort to temporary - permanent injuries, representing an economic health impact for companies and workers. Active breaks (AB) are proposed as an effective tool to reduce the effects of occupational risks. The objective is to design a AB program as a strategy in the management of musculoskeletal symptoms (MS) in office workers (OW). **Methods**: This is a longitudinal cohort study with a quantitative approach, involving 26 workers. Based on the review of the evidence and an evaluation with the Nordic Standardized Questionnaire (NSQ) and the Visual Analog Pain Scale (VAS), appropriate exercises for the population were established. A program with its respective dosage was designed and it was validated by the judgment of three experts. The content Validity Index (CVI) was used. **Results**: These revealed a higher frequency of discomfort in the neck, shoulders and thoracolumbar region, decrease in MS in frequency, duration and intensity of both clinical and statistical pain ($p<0.001$). **Conclusions**: The AB program, based on yoga, determined changes in the intensity, duration and frequency of the MS. It served as a strategy for MS management.

Keywords: Sustainable health; postural balance; ergonomics; occupational diseases; current workplace trends.

RESUMO

Antecedentes: A jornada de trabalho acarreta muitos tempos de inatividade, causando ligeiro desconforto a lesões temporárias - permanentes, representando um impacto económico na saúde das empresas e dos trabalhadores. As pausas ativas (AB) são propostas como uma ferramenta eficaz para reduzir os efeitos dos riscos ocupacionais. O objetivo é desenhar um programa de AB como estratégia no manejo de sintomas musculoesqueléticos (SM) em trabalhadores de escritório (TE). **Métodos**: Trata-se de um estudo de coorte longitudinal com abordagem quantitativa, envolvendo 26 trabalhadores. Com base na revisão das evidências e na avaliação com o Questionário Nórdico Padronizado (NSQ) e a Escala Visual Analógica de Dor (EVA), foram estabelecidos exercícios apropriados para a população. Foi elaborado um programa com sua respectiva dosagem e validado pelo julgamento de três especialistas. Utilizou-se o Índice de Validade de Conteúdo (IVC). **Resultados**: Estes revelaram maior frequência de desconforto no pescoço, ombros e região toracolombar, diminuição na SM na frequência, duração e intensidade da dor tanto clínica quanto estatística ($p<0,001$). **Conclusões**: O programa AB, baseado no yoga, determinou alterações na intensidade, duração e frequência da EM. Serviu como estratégia para a gestão do MS.

Palavras-chave: Saúde sustentável; equilíbrio postural; ergonomia; doenças ocupacionais; tendências atuais no local de trabalho.

INTRODUCTION

Musculoskeletal disorders (MSDs) refer to injuries of the musculoskeletal system, caused by physical and functional alterations of body structures and tissues, which can be associated with work (Paredes & Vásquez, 2018). MSDs are caused by being subjected to repetitive loads and activities for a prolonged period of time. They mainly affect the back, neck, shoulders and upper limbs. The symptomatology of this condition varies from mild discomfort, pain of varying intensity, decrease or loss of strength to functional limitation of the affected segment (Paredes & Vásquez, 2018), (García & Sánchez, 2020). They can cause temporary or permanent disability (Ramirez & Montalvo, 2019). These disorders affect the health of employees, as well as the productivity of companies (García & Sánchez, 2020), (Paredes & Vásquez, 2018). In high-income countries, 441 million people are reported to be affected each year with MSDs (WHO, 2021), (Simbaña et al., 2021). Dysergonomic risk factors are defined as the main responsible for MSDs, as well as maintained postures, repetitive movements, organizational, psychosocial factors and work environment. They increase the risk of suffering from these symptoms (García & Sánchez, 2020), (OSHA, 2022).

A sedentary lifestyle, assumed to be part of daily life, caused by long working hours, is a precursor to cardiovascular diseases, increased morbidity, diseases associated with obesity, stress and alcohol consumption (Odeen et al., 2013), (Lee et al., 2012). According to the International Labor Organization (ILO), 59% of all occupational diseases are MSDs, with a global prevalence of between 13.5%-47% (ILO, 2019), (Cimmino et al., 2011). Various studies have shown that between 20%-60% of office workers suffer from MSDs (Sánchez, 2018), (Cimmino, 2011). They are the main factor in the need for rehabilitation in

the world (WHO, 2021). MSDs represent a global problem for the health of the working population (Simbaña et al., 2021). Besides, they are the main cause of temporary disability in Spain (Ramírez & Montalvo, 2019). In the European Union, spending on work-related illnesses and accidents reached between 2.6%-3.8% of the Gross Domestic Product (GDP) and 40%-50% corresponds to MSDs (Echezuría, et al. , 2013), (GBD, 2017). In Latin America, the costs are much higher, ranging from 9%-12% of GDP (García & Sánchez, 2020).

In Ecuador, according to data from the Ecuadorian Social Security Institute (IESS), it was reported that Pichincha was the province with the highest number of notifications of occupational diseases with 57.1%, followed by Guayas with 16.6%. The main cause was ergonomic risk in 82.3%. The occupational diseases with the highest incidence were chronic low back pain with 16.1%, followed by painful shoulder in 12.4% and herniated disc with 10.1% (IESS, 2018). The evidence indicates that physical activity programs, considering exercise in all styles, prevent chronic degenerative diseases. They improve physical and psychological conditions (Álvarez et al, 2017).

The corresponding recommendations and the promotion of a preventive culture throughout society allowed us to focus efforts on integrating protection measures and show respect for the physical-psychological integrity of company workers (ILO, 2022). Thus, the need arises to integrate exercise into the workplace, based on multiple health benefits. It is a strong protective factor against various dysfunctions, as well as disorders derived from it. The workday involves a lot of downtime, which has a great impact on the health of staff and on the company due to its relation to the reduction in work absenteeism (López & Garatachea, 2018).

ABs are an economical alternative, easy to apply and learn. It allows energy recovery, improves performance, as well as effectiveness at work. They include a series of initial movements of the joints, followed by stretching, as well as specific exercises for different muscle groups. It is accompanied by rhythmic, deep and slow breathing. They should usually be carried out in groups, educating workers on how to perform the exercises, so that they can develop them autonomously. It is important not to interfere with production times, taking into account the characteristics of each work area (Jaspe 2018).

Currently, ABs are an alternative in the management of MSDs. According to Santomaro (2022), it establishes that MSDs potentially develop in work environments that demand sustained, prolonged, and forced postures due to lifting, handling of loads or due to institutional factors that encourage the progression of these conditions. Among the most common effects are low back pain in workers and absence from work. The effectiveness of implementing ergonomic methods and physical activity through ABs in the office work routine has the aim of preventing musculoskeletal injuries at the lumbar spine level. Research results affirm low back pain as an occupational health problem. The implementation of ergonomic programs as well as the prescription of physical activity, ABs and training favors prevention. They avoid the chronicity of low back pain in these workers and contribute to reduce the intensity of pain in people who already suffer from it. Therefore, ABs limit its progression and chronicity.

In their study, the authors Akkarakittichoke et al., (2021), consider that MSDs represent a significant burden for society, due to the high prevalence, substantial costs associated with the loss of working days and decreased productivity. The objective was to determine the effectiveness of active rest interventions, postural changes aimed at reducing sitting discomfort, duration of recovery, recurrence of neck and back pain among high-risk office workers. A 12-month follow-up was carried out on 13 healthy high-risk office workers. One group was provided with custom-designed devices to facilitate active breaks, as well as postural changes. The control group was provided with a seat pad as a placebo medium. Therefore, they concluded that the interventions were positive, shortened recovery time, reduced recurrence of neck and back pain among high-risk office workers.

Waongenngarm et al., (2021), in their study, reflected on the high incidence rates of neck and back pain in office workers, constituting a great socioeconomic burden both for the individuals who suffer from them and for society as a whole. The authors evaluated the effects of ABs promotion, as well as postural changes on the appearance of said symptoms. They did a 6-month follow-up of high-risk office workers. Interventions based on ABs and postural changes favorably reduce the appearance of new pain in the aforementioned body regions in office workers.

According to Cañas (2018), in his study, he emphasized the need to promote measures that contribute to improving work performance. The author set out to improve the quality of the work experience in each work area and avoid routine. It helped to the prevention of MSDs, physical and psychological stress through the practical application of ABs. The program was carried out in work environments, lasting 15 minutes, between 2 to 4 times per week. The results revealed 82% satisfaction, while 11% gave recommendations to consider its application at the beginning of the process. The study concluded that the implementation of ABs generated benefits for the company at a productive level, as well as for the staff. It is the best alternative for maintaining health, as well as for the well-being of the worker, guaranteeing their quality of life. For this reason, the objective was to apply a program of active breaks as a strategy in the management of musculoskeletal symptoms in office staff.

METHODS

This article corresponds to a development project with physiotherapy intervention, under a quantitative, longitudinal cohort approach. The study was carried out at the Ecuadorian Red Cross Provincial Board of Pichincha, with 42 people working in the administrative area. For the selection, the following inclusion criteria were applied: office staff who present musculoskeletal symptoms in the upper back, lower back, and upper limbs, aged between 25-50 years, male and female. The following exclusion criteria was considered: being in physiotherapeutic and pharmacological treatment at the time of participation, surgical processes, recent consolidation (6 months ago), and a history of vertigo and herniated discs with or without radiculopathy. After the selection, a census sample of 26 workers remained.

Information collection

Information was collected at the beginning and at the end of the intervention, using the following instruments:

Standardized Nordic Questionnaire (SNQ): is a useful and important tool to reliably identify MSD symptoms in productive work personnel and their different Anatomical locations that estimates the symptoms they presented over 12 months (Martínez, 2017). The validation and reliability of the instrument was carried out in Mexico, through a reliability analysis. A Cronbach's alpha of 0.863 was obtained -estimated to be very good. A verification was carried out by exploratory factor analysis of the structure of the instrument; whose results indicated a fit value of $\chi 2 = 550$, ($p<0.001$). The value obtained was KMO = 0.822 per sample adaptation measure, where a good fit was determined. Nine factors were obtained from the body segments studied, which indicated 72, 05% of the total variance. The results demonstrate the reliability and validity of the instrument (González, 2021).

Visual Analogue Pain Scale (VAS): allows measuring the intensity of the pain described by the patient with maximum reproducibility between observers. It consists of a 10 centimeter horizontal line. At the ends of the line are the extreme expressions of the symptom. On the left is the absence or lower intensity and on the right is the highest intensity. The patient is asked to mark the point on the line which indicate intensity. It is measured with a millimeter ruler. The intensity is expressed in centimeters or millimeters. The validation and reliability of the instrument through the test – retest are good (r = 0.94 to 0.71). Its validity is highly correlated with other pain measurements (r= 0.62 to 0.91), sensitive to changes linked to treatment. This scale is very simple to perform and in a short time (Ubillos et al., 2019).

The interpretation of the VAS is as follows (Jensen et al., 2003):

No pain if the patient points between 0-4mm

Mild pain if the patient points between 5-44mm

Moderate pain if the patient points between 45-74 mm

Intense pain if the patient points 75-100 mm

Active breaks program

The ABs program includes yoga exercises as an ancient, unconventional technique that has three essential components: muscle stretching, breathing control exercises and meditation for a mind-body intervention (Giménez et al., 2020). Supine postures, prone postures, rapid relaxation technique, sitting postures, standing postures and deep relaxation techniques were chosen (Soto, 2010). The program was sent for review to a group of 3 experts in the area of occupational health and ergonomics, who validated the program.

It was arranged in 3 phases:

- First phase (contact and evaluation): It was carried out for one day, in which the program was socialized. The workers signed the informed consent and subsequently the evaluations began, using the aforementioned tools.

- Second phase (intervention): it was carried out as follows: in week 1 and 2, the exercises began:

Easy posture – sukhasana: the program began with a simple and comfortable posture for relaxation, meditation and breathing. In a sitting position, adducting the hips with legs crossed, feet under the knees, elongating the spine, and hands on the knees. They must press the sit bones towards the floor, while raising the crown of the head upward to elongate the entire spine. The shoulders are located back and down, the chest forward. With this posture it is necessary to relax the face, jaw and belly, as well as bring the tongue towards the palate behind the front teeth. The posture is accompanied by deep breathing through the nose into the stomach, maintaining the time tolerated by each person and exhaling.

Corpse posture – savasana: it is a posture of total relaxation. The body is placed in a neutral position. The legs are located at the level of the midline in relation to the torso, and the feet respectively aligned. The pelvis should be relaxed, but not flatten the lumbar spine. With their hands, lift the base of the skull from the back of the head, if necessary, accommodate

the neck with a folded blanket, and make sure that the ears are aligned with the shoulders. The shoulders should be secured on the floor, arms extended along the body and palms facing up. Imagine that the lower end of their shoulder blades will be lifting diagonally across their back towards the top of the sternum. From there, relax the collarbones, face, base of the tongue, nostrils, the inner ear canals, the eyebrows, the skin, muscles and expression of the forehead. Sink the eyes towards the back of the head, and tilt the chin towards the heart. Accompany with deep breaths.

Mountain posture – tadasana: in a standing position, place the feet hip-width apart, hips elevated, buttocks relaxed, directing the sacrum downward, arms extended and chest raised somewhat, head looking forward and upward, in such a way that the spine, as well as the body in general, can be verticalized. The shoulders must be relaxed, the feet (fingers, soles and heels) must be well planted on the ground, maintaining their normal arch, without unloading all the weight on the heels, distributing the weight equally, forming a triangle between the heel, the first metatarsal and the fifth metatarsal, accompany with several breaths and maintain the position.

From week 3 to 5, they performed the following exercises:

Neck movements: exercises were performed in flexion, extension, lateral inclination and right and left rotation.

Shoulder movements: flexion and extension exercises. Abduction, adduction, rotations (internal – external) and elevation, with variation of sitting and standing positions were performed.

Finally, from week 6 to 8, they performed the medium intensity exercises:

Straight stick posture – dansasana: this posture should be performed in a seated position on the floor, with the legs extended, the back straight, the hands resting on the floor on the sides of the hips and the fingers extended towards the feet. Rotate the thighs inward, dorsiflex the ankles with the toes toward the ceiling. Keep the dorsal spine upright and place the shoulders parallel to the hips. Accompany with breaths.

Half-bridge posture – setu bandhasana: this posture begins in a supine position, the legs are bent, bringing the feet closer to the buttocks, and later raising the hips, with the strength of the legs. In this posture the cervical spine must be upright, avoiding undue effort with the cervical region, accompanied by breathing.

Cobra pose – bhujangasana: prone positioned, and stretching the back of the body. Rest the forehead on the floor, legs extended and joined. Keep knees firm, feet pointed. Rest the palms of the hands towards the pelvic region. Perform an Inhale, press with firm palms on the floor, lift and elevate the trunk forward. Take two breaths. Subsequently, inhale and lift the body off the ground from the trunk to the pubis, in contact with the ground. Maintain the posture with the weight on the legs and palms. Contract the perineum, gluteus and thighs. Hold the posture for 20 to 30 seconds, breathe normally, then as you exhale, bend the elbows and rest the trunk on the floor.

Cat pose – marjarasana: stand in a four-point position, with the palms of the hands and knees in contact with the ground. Imagine that a straight line passes from the chin to the sacrum, place the hands at shoulder level, knees below the hips, extend the fingers and direct them forward. Press the palm of the hand on the ground. Elongate the spine upward while looking at the ground between the hands. On inhalation, lift the buttocks and head. On the exhale, arch the back completely. Subsequently, lower the trunk towards the ground. Continue with the movements of arching and lengthening the spine, synchronizing with breathing through the nose. Make sure not to hold the breath.

Downward facing dog posture – adho mukha svanasana: this posture is known as the inverted "V". It will start from the four-point posture, raising the hips as high as possible, directing them backwards. The cervical spine is relaxed, the shoulders are away from the ears, the arms are extended and with the palms of the hands resting on the floor, place the knees extended, settling the heels. Fully elongate the spine, accompany with breathing.

Chair pose – utkatasana: this pose will start from the downward facing dog pose or standing. To execute, you must place the feet together and parallel, keep the weight on the base of support, place the knees bent, raising the chest and arms, while the palms of the hands face each other, with the fingers fully extended towards each other. Maintain the normal curvature of the back. As much as possible, this position should be comfortable. Within the muscular tension that the legs must withstand, maintain it for 3 breaths.

Phalakasana posture – table or plank: this posture can be achieved starting from the downward facing dog posture, lowering the hips, activating the abdominal muscles, keeping the back straight and the arms extended along the body, wrists at the same height of the shoulders, keeping the entire body firm. Avoid hip flexion with contraction of the lower back; it is important to keep the abdomen firm and up. When remaining in this position, take a full breath and increase your breaths as you gain strength.

Vkrsasana posture – the tree: to start this posture, place yourself in tadasana or mountain posture, lean firmly on your left leg, place your left hand on your hip to find balance. Bend the right leg laterally and place the sole of the foot

against the upper part of the inner thigh. Bring the right knee back, in line with the right hip. Bring palms together and slowly bring the arms up over the head, keeping the elbows extended. Elongate the sides of the body, head straight. Remain in the position, breathing deeply. While exhaling, lower the arms and legs little by little at a time (Soto, 2010).

The exercises were distributed by weeks and to the tolerance of the workers.

- Third phase (reevaluation), was carried out at the end of the eighth week of intervention, in which, the changes in musculoskeletal symptoms and the intensity of pain presented by the workers were reviewed. The same tools were used.

The time allocated for the application of the program was 8 weeks, with a frequency of 3 times a week and a duration of 20 minutes per session, during the work day, since the intervention was carried out in the workplace (Arévalo et al. al., 2020) (Ramos et al., 2016).

INFORMATION PROCESSING AND STATISTICAL ANALYSIS

-The data obtained from the physiotherapy assessments (Visual Analog Pain Scale VAS and Standardized Nordic Questionnaire) will be processed through the SPSS V21 statistical system, so a database was created that allowed the generation of descriptive tables.

-To verify the hypothesis, the Wilcoxon rank statistical test was applied; considering that the variable to be measured is categorical and two measures were applied (before and after the intervention) to the same group of participants. The level of significance for the development of the test was 95%, because the level of risk of error was 5% (0.05). If in the results of the statistical test the probability of p value is less than alpha, the null hypothesis is rejected (Ho), and the alternative hypothesis (Hi) is accepted. While, if the probability obtained in p value is greater than alpha, the null hypothesis is accepted (Ho) and the alternative hypothesis is rejected (Hi). The results were described in explanatory tables for better interpretation.

ETHICAL AND GENDER CONSIDERATIONS

In knowledge of the Law of Rights and Protection of the Patient (National Congress of Ecuador, 2006); and Organic Health Law (National Congress, 2015) on the patient's rights to confidentiality (Article 4), to information (Article 5) and to decide (Article 6), the project was presented. Initially, authorization was requested from the Ecuadorian Red Cross Provincial Board of Pichincha, based on this, a socialization of the project was carried out among all office staff, to share the details, benefits, possible effects and answer the population's doubts. In addition, the signing of the informed consent was requested. This document guarantees the voluntary participation of the participants, detailing the objective, purpose, benefits and risks of their participation, as well as the freedom to abandon the process at any time. Additionally, it was indicated that participation will not have any type of remuneration, and that their data will be treated anonymously, used exclusively for academic and research purposes. The research protocol was reviewed and approved by the Human Research Ethics Committee of the Faculty of Health Sciences of the Technical University of Ambato. The assigned code is: 043-CEISH-UTA-2023, indicating that it complies with all the ethical, methodological and legal requirements established in the regulations.

Finally, for the intervention, the clothing and footwear used by the workers was taken into consideration, so that they are comfortable when performing the exercise routine.

RESULTS

DESCRIPTION OF MUSCULOSKELETAL SYMPTOMS IN OFFICE WORKERS, THROUGH THE STANDARDIZED NORDIC QUESTIONNAIRE (SNQ)

Table 1. Musculoskeletal symptoms in office staff: manifestation, consequence at work, treatment

Zone	Neck						Shoulder		Dorsum - Lumbar				Elbow - Forearm			Hand – Wrist				
	Yes	NO	Left		Rigth		Yes	NO	Left		Rigth		Both			Left		Rigth		Both
Questions			Yes	NO	Yes	NO			Yes	NO	Yes	NO	Yes	NO	Yes	NO	Yes	NO	Yes	NO
Have you had any discomfort?	23	3	13	13	8	16	20	6	0	26	3	23	2	24	3	23	7	19	5	21
Have you needed to change your work position?	2	24	2	24	3	23	14	12	0	26	2	24	2	24	3	23	0	26	2	23
Have you had discomfort in the last 12 months?	23	3	13	13	8	16	20	6	0	26	2	24	2	24	3	23	7	19	5	21
Have you received treatment for these discomforts in the last 12 months?	1	25	0	26	0	26	15	11	0	26	2	24	2	24	0	26	0	26	0	26

The results of office personnel obtained from the SNQ were analyzed question by question. So in the question: Have you had musculoskeletal discomfort in...? show that the most frequent pain occurs in the neck with 23 office workers, in the thoracolumbar region with 20 and shoulders with 13 on the left (left) and 8 on the right (right). While with a frequency between 2 and 7, symptoms are found in the elbow, forearm, wrist and hand.

Regarding the question: Have you needed to change jobs? The majority of office workers with symptoms in the thoracolumbar region have done so. While very few have done so when having pain in the neck, shoulder, elbow, forearm, wrist and hand.

Regarding the question: Have you had any discomfort in the last 12 months? The perception of office workers indicates that 23 in the neck region, 13 in the shoulder, and 20 in the thoracolumbar region have presented discomfort in the last 12 months.

According to the question: Have you received treatment for these discomforts in the last 12 months? Workers with discomfort in the thoracolumbar region have received treatment. Consequently, the results reveal a significant presence of MSD in the neck and thoracolumbar region, which has been present in the last year, and which has forced many office workers to change their job. But despite this situation, very few have received treatment for these ailments; assuming that it may be the worker's carelessness, lack of time due to their work schedules or not having access to a public or private health service. Therefore, it is necessary to apply a physiotherapeutic intervention that addresses this problem and takes into account the needs of this population (Table 1).

Table 2. Time of appearance of musculoskeletal manifestations.

	Neck	**Shoulder**	**Dorsum - Lumbar**	**Elbow - Forearm**	**Hand – Wrist**
1 - 4 weeks	2	3	0	0	3
13 months	6	6	8	2	3
4 - 6 months	7	3	3	0	3
7 - 9 months	0	0	1	1	0
10 to 12 months	7	2	8	2	5

At the time of appearance of musculoskeletal manifestations in the last 12 months, most office workers who have neck discomfort, 6 have suffered from it for 1 to 3 months, 7 for 4 to 6 months, and for 1 and 12 months. . In those who have shoulder discomfort, the majority presented it 1 to 3 months ago. As for discomfort in the thoracolumbar and elbow/forearm region, they said they had it for 1 to 3 months or 10 to 12 months. In the wrist/hand region most had discomfort for 10 to 12 months. From this perspective, musculoskeletal symptoms have been affecting the majority of office workers for 10 to 12 months, a very long time that may be affecting the physical and psychological health and work performance of this population (Table 2).

Table 3. Duration of musculoskeletal manifestations in the last year.

Options	Neck	Shoulder	Dorsum - Lumbar	Elbow - Forearm	Hand – Wrist
1-7 days	10	8	10	3	7
8-30 days	1	0	2	1	1
>30 days	9	5	5	0	4
Always	3	2	3	1	2

Regarding the duration of musculoskeletal manifestations in the last year, office workers mention 1 to 7 days, both those who have discomfort in the neck, shoulder and thoracolumbar region; from 8 to 30 days thoracolumbar region; >30 days (not in a row) in the neck, thoracolumbar and shoulder. "Always" answers were less frequently in the neck, shoulder and thoracolumbar regions. The results show that the majority of discomfort lasts a continuous week, followed by >30 non-continuous days. Therefore, it can be assumed that office workers have several episodes of pain during the month (Table 3).

Table 4. Time in which musculoskeletal manifestations have prevented office staff from doing their work.

Options	Neck	Shoulder	Dorsum - Lumbar	Elbow - Forearm	Hand – Wrist
1-7 days	18	11	17	5	13
8-30 days	5	1	3	0	2
>30 days	0	0	0	0	0
Always	0	0	0	0	0

During the time when musculoskeletal manifestations have prevented office staff from doing their work, in the last 12 months, it can be seen that the majority of office workers indicate that the MSDs they present has not prevented them from doing their work in the last 12 months. Although some recognize that between 1 and 7 days the symptoms, especially in the neck and thoracolumbar region, have prevented them from doing their work in the last year. The data assume that the symptoms presented by workers are not yet a factor that alters performance or work activity, but if it persists it could prevent them from doing their job. As in some cases, they might represent expenses for the company, health complications, alteration of the worker's well-being and decreased performance (Table 4).

VARIATIONS IN MUSCULOSKELETAL SYMPTOMATOLOGY BETWEEN INITIAL AND FINAL ASSESSMENT THROUGH THE STANDARDIZED NORDIC QUESTIONNAIRE (SNQ)

Table 5. Episode length

Measures	**Initial assessment**					**Final assessment**				
Regions / **Options**	**Neck**	**Shoulder**	**Dorsum – Lumbar**	**Elbow – Forearm**	**Hand – Wrist**	**Neck**	**Shoulder**	**Dorsum – Lumbar**	**Elbow - Forearm**	**Hand – Wrist**
<1 hour	7	5	6	3	5	1	2	1	3	3
1 to 24 hours	10	7	6	2	4	3	4	1	0	4
1 to 7 days	3	3	4	0	2	1	1	2	0	0
1 month	2	1	2	0	1	0	0	0	0	0
1 to 4 weeks	0	0	0	0	0	0	0	0	0	0

In the comparison of measures related to the duration of the episodes, it was found that in the initial evaluation the majority of office workers presented duration of between 1 to 24 hours for 29 symptoms, followed by duration of less than one hour for 26 symptoms. While after the application of the AB program, the duration of the episodes decreased to 11 symptoms lasting from 1 to 24 hours and to 10 symptoms lasting less than one hour. In this way, it can be seen that when carrying out the AB program, the duration of the discomfort that the office workers initially experienced decreased by approximately 50% in all of them (Table 5)

Table 6. Location of musculoskeletal manifestations in the last 7 days in office staff (initial and final assessment).

Measures	**Initial assessment**								**Final assessment**							
Regions / **Options**	**Neck**	**Shoulder Right**	**Left Shoulder**	**Dorsum – Lumbar**	**Elbow – Forearm Right.**	**Elbow – Left Forearm**	**Hand – Wrist Right.**	**Hand – Left Wrist**	**Neck**	**Shoulder Right**	**Left Shoulder**	**Dorsum - Lumbar**	**Elbow – Forearm Right.**	**Elbow – Left Forearm**	**Hand – Wrist Right.**	**Hand – Left Wrist**
YEAH	18	17	13	6	8	6	17	eleven	3	6	eleven	4	3	3	3	3
NO	8	9	13	twenty	16	twenty	9	14	23	twenty	fifteen	22	23	23	twenty	twenty

In the comparison of measures related to the location of musculoskeletal manifestations in the last 7 days in office personnel, initial and final assessment, it was found in the initial evaluation that the majority of office workers (18) presented pain in the neck, 17 in the right shoulder, 13 in the left shoulder, 6 in the thoracolumbar region, 8 in the right elbow/forearm, 6 in the left elbow/forearm, 17 in the right hand/wrist, and 11 in the left hand/wrist. After the application of the AB program, this perception of discomfort in the last 7 days decreased to 3 in the neck, 6 in the right shoulder, 11 in the left shoulder, 4 in the thoracolumbar region, 3 in the right and left elbow and 3 in the hand /wrist both right and left. Consequently, there is a decrease in the frequency of MSDs in the last 7 days, after the application of the AB program (Table 6).

Table 7. Perception of the intensity of the discomfort.

Measures	**Initial assessment**					**Final assessment**				
Options/Scores	1	2	3	4	5	1	2	3	4	5
Neck	0	7	10	2	4	6	10	4	3	0
Shoulder	0	5	6	5	0	4	8	3	1	0
Dorsum – Lumbar	0	3	9	4	4	3	8	8	1	0
Elbow – Forearm	0	4	1	1	0	4	1	1	0	0
Wrist – Hand	1	6	6	2	0	5	5	4	1	0

Score: (0 no pain – 5 very strong discomfort).

In the comparison of measures related to the perception of the intensity of the annoyances, it was found in the initial assessment that the majority of office workers rated their discomfort with values of 2, 3 and 4 points in all regions. A smaller proportion indicated scores of 1 and 5, especially in the hand/wrist, elbow/forearm, neck and thoracolumbar. While, after the intervention, in the final assessment, the majority qualified with a score of 1, 2 and 3 in all regions. Consequently, there is a decrease in the perception of the intensity of MSDs after the application of the AB program (Table 7).

Table 8. VARIATIONS IN PAIN INTENSITY IN OFFICE STAFF.

EVE		**Initial assessment**		**Assessment Final**	
Scores	Pain intensity	Fr	%	Fr	%
0 to 4mm	Without pain	0	0	0	0
5 to 44mm	Soft pain	7	27	16	69
45 to 74mm	Moderate pain	eleven	42	8	31
75 to 10mm	Intense pain	8	31	0	0
TOTAL		26	100	26	100

Visual analog pain scale (VAS).

In the comparison of measurements of pain intensity through the VAS scale, it was found in the initial evaluation that 27% of the population presented a mild level, 42% moderate and 31% intense. While after the intervention these levels decreased, with 69% of office workers presenting with mild pain and 31% with moderate pain. The results reflect a considerable decrease in the intensity of pain that office workers associated with the application of AB (Table 8).

HYPOTHESIS VERIFICATION

Table 9. Verification of the Hypothesis through pain intensity

	Final Pain Intensity - Initial Pain Intensity
Z	-3.873b
Asymptotic sig. (bilateral)	.000

Wilcoxon Rank Test

Statistically, after the application of the AB program as a strategy in the management of MSDs in office staff, it was possible to verify that, through the Wilcoxon Rank test for related samples, there is a significant difference in the intensity of the pain, obtaining a probability of ($p<0.001$) in the VAS. This statistical value being less than alpha (0.05), the research hypothesis can be accepted and the null hypothesis rejected. It means that there are significant differences between the measurements of pain intensity after the application of the PA program in office staff ($M1 \neq M2$) (Table 9).

DISCUSSION

Office staff, due to their hours and heavy workload, constitutes a population exposed to a high risk of suffering from musculoskeletal disorders. Thus they can develop anything from mild discomfort, recurrent pain, loss of strength and even functional limitation; affecting the health of employees and the growth of companies due to the high cost of absenteeism. In this way, global efforts have focused on the integration of strategies within organizations to mitigate this phenomenon, such as AB, where they have been developed in a general way without an estimate of the needs of workers, being imprecise and without generating the expected results. Thus, in the present study, a PA program based on yoga exercises was designed as a strategy in the management of SME in office staff. Thus, 26 workers were assessed with the SNQ and the VAS to identify the needs of the workers. It was found that 23 office workers had discomfort in the neck, 20 in the thoracolumbar region, 13 in the left shoulder, 8 in the right; 7 in wrist/hand and less frequently elbow/forearm with 2 workers. The majority of workers presented their discomfort 10 to 12 months ago; the majority of office workers with symptoms in the thoracolumbar region have needed to change jobs. Likewise, workers with discomfort in the thoracolumbar region have received treatment in the last 12 months. Furthermore, the discomfort they experienced lasted between 1 to 7 days with episodes of 1 to 24 hours for the majority of office workers. Although it has not prevented a very large part of them from carrying out their work activities, some workers with neck and regional discomfort dorsolumbar have presented limitations.

When rating their discomfort, the majority scored 3, which refers to a mild intensity. They also attribute their presence to workload and stress. In the initial evaluation of pain intensity, the majority of workers report having pain intensity between moderate and intense. Mild to intense levels were found. These findings are similar to those found by Zamora et al., (2019). After applying the SNQ, they found a higher prevalence of musculoskeletal disorders in the neck and thoracolumbar region, which also resemble those obtained by Sánchez, (2018), who also found a high prevalence of shoulder discomfort. In this way, considering the behavior of the MSDs of the office staff, the program was structured in 3 phases, with a duration of 8 weeks, a frequency of 3 times per week, and a time of 20 min per session. The intensity varies according to the response of the participants. The exercises were based on yoga postures as a special technique: Supine postures, prone postures, quick relaxation technique, sitting postures, standing postures and deep relaxation techniques.

After the application of the AB program, the duration of the episodes, the location of the musculoskeletal manifestations, the perception of pain intensity and the pain intensity were re-evaluated using VAS. Thus the duration of the episodes went from 1 to 24 hours to less than 1 hour. In the presence of discomfort in the last 7 days, workers went from 83 times of discomfort to 38. In relation to the rating of discomfort, they went from a level 3 in the initial assessment to a level between 2 and 1 for the majority of workers. While the intensity of the population's pain through the VAS, after the active pauses, went from a moderate-intense intensity level to a mild-moderate intensity. It demonstrates significant differences between measurements with ($p<0, 001$) in the Wilcoxon Rank test. There is very little scientific evidence on the effects of yoga as active breaks in longitudinal or comparative studies. However, there is a study by Whitehead et al., (2017)., where they compare yoga exercises with conventional exercises. They found clinical differences after the intervention in favor of yoga exercises, and in the intensity of pain that the workers presented, although these were not reflected statistically. On the other hand, considering that yoga is a type of exercise, reference can be made to the findings of exercises such as AB to reduce MSDs in workers. Thus, Shiri, et al., (2018), in a comparative study, of aerobic exercises performed 2 to 3 times a week, obtained an improvement in low back pain, revealing a decrease in its severity and a significant difference compared to control groups. And similarly Cáceres et al., (2017), with their AB program, the frequency of musculoskeletal discomfort in the neck was reduced by 20% in the last 7 days ($p<0.001$), 17% in the thoracolumbar area ($p<0.001$), as well as the intensity of pain ($p<0.05$), for all the segments they evaluated. Consequently, the yoga-based AB program can be used as a strategy in the management of MSDs in office staff.

CONCLUSIONS

Office workers reveal a significant presence of MSDs in the neck, shoulders and thoracolumbar region, which has been present in the last year, forcing them to change their job. Despite this situation, very few have received treatment for these ailments. They also consider that the cause of their discomfort is the workload and stress they face. They also report pain intensity between moderate and intense. In this way, it is necessary to integrate a physiotherapy intervention within the work schedule that addresses this problem and considering their needs. This population has a high potential to develop musculoskeletal disorders, and although they currently perceive it as discomfort, it is presumed that they will get worse over the days, affecting not only their physical health, but also their psychological, social sphere and even their work performance.

The evidence and the needs of office staff demonstrate that exercises should focus mainly on the spine and shoulders, where a change is achieved in the position they maintain during the day, promoting muscle stretching, as well as relaxation of workers. Therefore, yoga as an AB is a successful technique. Workers can perform the exercises during their workday and not abandon the treatment. This can reduce the risk of chronic injuries associated with work.

After the application of the yoga-based AB program as a strategy in the management of MSDs in office staff, a positive variation in the intensity of pain has been verified, decreasing from moderate-intense to mild-moderate levels. It was evidence a statistically significant difference between measurements for pain intensity ($p<0.001$). Likewise, in the SNQ, they went from a classification of 3 for the intensity of the discomfort to a score between 2 and 1. The frequency of discomfort and the duration of the episodes decreased. Therefore, it can be indicated that the yoga-based AB program has positive effects, becoming a strategy in the management of MSDs in office workers.

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