

**Musculoskeletal disorders and ergonomic risks in the administrative staff of an IES****Trastornos musculoesqueléticos y riesgos ergonómicos en el personal administrativo de una IES**

SORIANO-PORRAS, Dulce María†\*, CLILA-LUNA, Alma Belen, GÓMEZ-GARCIA, Paul and DÍAZ-HERNÁNDEZ, Alonso

*Universidad Interamericana S.A.*

ID 1<sup>st</sup> Author: *Dulce María, Soriano-Porras* / **ORC ID:** 0000-0001-7398-0693, **Researcher ID Thomson:** E-8233-2018, **arXiv Author ID:** 8GO6IR-3HFFHH, **CVU CONACYT ID:** 505429

ID 1<sup>st</sup> Co-author: *Alma Belén, Clila-Luna* / **ORC ID:** 0000-0002-1958-6369, **Researcher ID Thomson:** AAW-1610-2020, **arXiv Author ID:** RJM8IJ-EJKDM7, **CVU CONACYT ID:** 626587

ID 2<sup>nd</sup> Co-author: *Paul, Gómez Garcia* / **ORC ID:** 0000-0001-7651-9712, **CVU CONACYT ID:** 1262638

ID 3<sup>rd</sup> Co-author: *Alonso, Díaz Hernández* / **ORC ID:** 0000-0002-4304-7744, **CVU CONACYT ID:** 370494

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**Abstract**

Musculoskeletal pain in the work environment represents a problem within public health, which is caused by various factors. This situation is not alien to the staff that works at the Amozoc Polytechnic University, made up of a population of 47 people in the full-time administrative and academic area, who within their office activities carry out repetitive movements, adopting postures for prolonged time, generating an increase in energy expenditure and lacking ergonomic adaptations that predispose staff to suffer from some type of musculoskeletal disorder that in the long term will trigger the appearance of chronic degenerative disorders of the locomotor system because, according to the WHO (2021) these affect 1710 million people causing disability, limiting mobility, dexterity and social participation. Therefore, the objective of this work is to identify the presence of pain associated with Musculoskeletal Disorders caused by risk factors during the workday, through the application of the Nordic questionnaire that is focused on the identification of musculoskeletal symptoms in occupational health. necessary to substantiate the need to promote physiotherapeutic intervention within the workplace in a preventive way that contributes to occupational health.

**Occupational health, Physiotherapeutic program, Musculoskeletal disorders**

**Resumen**

El dolor musculoesquelético en el entorno laboral representa un problema dentro de la salud pública, el cual es ocasionado por diversos factores. Esta situación no es ajena al personal que labora en la Universidad Politécnica de Amozoc, integrado por una población de 47 personas en el área administrativa y académica de tiempo completo, quienes dentro de sus actividades de oficina realizan movimientos repetitivos, adoptando posturas por tiempo prolongado, generando un aumento de gasto energético y careciendo de adaptaciones ergonómicas que predisponen al personal a padecer algún tipo de trastorno musculoesquelético que a largo plazo desencadenara la aparición de padecimientos crónicos degenerativos del sistema locomotor pues, según la OMS (2021) estos afectan a 1710 millones de personas provocando discapacidad, limitando la movilidad, destreza y la participación social. Por lo que el objetivo de este trabajo es identificar la presencia de dolor asociado a Trastornos Musculoesqueléticos provocada por factores de riesgo durante la jornada laboral, por medio de la aplicación del cuestionario Nórdico que está enfocado a la identificación de la sintomatología musculoesquelética en la salud ocupacional, necesario para fundamentar la necesidad de fomentar la intervención fisioterapéutica dentro del ámbito laboral de manera preventiva que contribuya a la salud ocupacional.

**Salud ocupacional, Programa fisioterapéutico, Trastornos musculoesqueléticos**

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\* Correspondence to Author (e-mail: dulcezully@gmail.com)

† Researcher contributing first author

**Introduction**

Exposure to unfavourable office working conditions can result in progressive deformities that cause functional limitations, as well as the appearance of short or long term injuries caused by work environments that do not consider ergonomics and physiotherapy programmes that contribute to occupational health to increase safety, productivity and comfort, this occurs in higher education institutions such as the Polytechnic University of Amozoc, where administrative and full-time teaching staff have musculoskeletal disorders related to prolonged inadequate posture, repetitive movements, stress and lack of ergonomic adaptations that cause long-term alterations of body functions, movement and restriction of work activities of administrative staff from hours to days, due to the presence of musculoskeletal pain that require a proposal for physiotherapeutic intervention to contribute to the field of Occupational Health responsible for assisting in the maintenance of health.

Therefore, the present work poses the following question: Will the identification of the presence of pain syndromes within the work scenario allow the identification of the need for a physiotherapeutic intervention programme as part of occupational health?

**Theoretical framework**

Physiotherapy is the service provided by physiotherapists to individuals to develop, maintain and restore movement and functional ability when movement and function are affected by ageing, injury, pain, disease, disorders, environmental factors (WP).

For the Physiotherapist it is very important to intervene in the improvement of the patient's performance capacity and their aim is to improve physical functioning and the prevention of disability through the maintenance of movement from any scenario based on the movement system and the kinesiopathological model.

**Movement System**

The movement system is composed of the following elements: base, modulatory, biomechanical and supportive, the contribution that each element makes is unique and requires interaction with the others for the production and regulation of normal movement. Diversity of forces and direction of movement is therefore necessary for tissues to maintain optimal kinesiological behaviour.

**Kinesiopathological Model**

Refers to repetitive movements and postures that induce changes in the base and modulatory system, causing alterations in the anatomical and functional components leading to musculoskeletal syndromes and disorders. Shirley A. Sahrman (2005).

**Musculoskeletal Disorder**

Cabezas and Torres, (2017) mention that musculoskeletal disorder is an injury that affects muscles, bones, tendons, ligaments, joints and intervertebral discs, when this is aggravated by work activities it is called work-related musculoskeletal disorder.

On the other hand, data from IMSS (2016) indicate that in Mexico, musculoskeletal disorders represented the following figures: 4,607 cases of dorsopathies, 1,663 cases of enthesopathies, 700 cases of carpal tunnel syndrome, 636 cases of shoulder injuries, 503 cases of radial styloid tenosynovitis of Quervain, 422 cases of other synovitis, tenosynovitis, 349 cases of bursitis, 184 cases of epicondylitis and 150 cases of osteoarthritis. The incidence represented an average of 12 workers suffering from a musculoskeletal disorder every day.

According to GBD 2016 Disease and Injury Incidence and Prevalence Collaborators (2017) "globally, low back pain, migraine, age-related and other hearing loss, iron deficiency anaemia and major depressive disorder were the five leading causes of years lived with disability (YLD) in 2016", which shows that musculoskeletal disorders are causing disability in the population manifested in one of these disorders such as low back pain.

Furthermore, the European Agency for Safety and Health at Work (EU-OSHA) (2019) issued its report on the prevalence, costs and impact of work-related musculoskeletal disorders, highlighting in first place health problems associated with musculoskeletal disorders with 60%, followed by stress, depression and anxiety with 16%. In such a way that musculoskeletal disorders can be considered a work-related disease, the Federal Labour Law in its article 475 defines a work-related disease as any pathological state derived from the continuous action of a cause that has its origin or motive in the work or in the environment in which the worker is obliged to provide his services. (SCT) 2018.

### **Monitoring of healthy working environments**

The Federal Labour Law establishes in article 2 that labour standards tend to achieve a balance between the factors of production and social justice, as well as to promote decent work in all labour relations, defining decent work as that in which the human dignity of the worker is fully respected (SCT) 2018, which should include health surveillance and injury prevention. IMSS (2022) mentions that health surveillance should be carried out by an interdisciplinary team composed of a doctor, nurse and physiotherapist. Taking as a reference the NOM-036-1-STPS-2018, whose objective is the prevention of musculoskeletal injuries through an analysis of ergonomic risk factors at work - identification, analysis, prevention and control. Also WHO (2008) mentions that work-related stress risks lead to back, neck and shoulder problems.

### **Occupational Health and Physical Therapy**

Both Occupational Health and Physical Therapy contribute to health; the former studies the modifications that work exerts on health and the latter intervenes from the movement in human occupation and therefore in the health of the working population. Alvis *et al*, (1999).

Since work through repetitive tasks, prolonged and maintained postures in the working day are health risks that cause occupational diseases aggravating other health problems, so reducing exposure to occupational hazards is vital foundation of the programs in preventive musculoskeletal disorders Cabezas and Torres, (2017).

### **Exercise programmes in the workplace**

The physical therapist is currently intervening in the workplace, his work is not only limited to the implementation of corrective programmes, he also contributes to the prevention of musculoskeletal disorders through health promotion in collaboration with the interdisciplinary team with the aim of generating a culture of prevention in occupational health in favour of the quality of life of the worker, the incidence in this participation is mainly in companies and institutions concerned about the health of their staff.

Some companies have implemented exercise programmes in the workplace, some of them focused on muscle stretching techniques, which have been shown to reduce musculoskeletal pain and exhaustion, considering them as a low-cost health strategy. (Montero *et al*, 2013).

In addition to this, studies indicate that relaxation programmes are effective for pain control from a multidisciplinary perspective, allowing the identification of the psychosocial component, where it is necessary to address a treatment through progressive muscle relaxation techniques where the user relaxes different muscle groups in addition to the management of diaphragmatic breathing exercises, which in synergy can contribute to reducing the intensity and frequency of pain, allowing the incorporation to work and their usual activities in addition to the reduction of drugs (Flores *et al*) 2004.

### **Postural hygiene and ergonomics**

Postural hygiene is a set of rules that establish the recommendations to maintain body alignment in both dynamic and static conditions, with the aim of promoting postural habits that favour the protection of the body, in order to avoid vicious postures that may cause possible injuries in the activities carried out by the human being. It is worth mentioning that work activities are one of the main causes of musculoskeletal injuries. It is for this reason that postural hygiene is fundamental in the workplace so that workers learn these rules and habits, in such a way that they integrate them as part of their daily work, as well as this must be complemented with ergonomics.

A science that studies the relationship between man and his environment, the aim of which is to reduce fatigue and injuries unnecessarily produced by work. It is not a pure science, but an applied science that feeds on different fields and one of these is postural hygiene (Montiel, *et al* 2011).

One of the main objectives of ergonomics is to generate the appropriate conditions to promote harmony between man and the environment in which he carries out his work activities, so that adaptations and strategies are generated that favour the detection of risks for the implementation of programmes that include ergonomics and postural hygiene as a reference.

**Method**

**Study design**

Quantitative research, descriptive type, cross-sectional design, conducted in 22 workers of a HEI in the year 2022.

In order to carry out this study, the instrument was applied virtually, which consisted of general information questions, health status questions and questions from the Nordic Kuorinka Questionnaire.

Table 1 shows a summary of the methodology used in this work.

Methodology	
Type of study:	Descriptive
Design:	Cross-sectional
Method:	Quantitative
Study region:	Amozoc, Puebla.
Unit of analysis:	1 Higher Education Institution.
Study Subject:	Administrative staff and full-time teachers
Sampling:	Census

**Table 1** Methodology  
*Source: Own Elaboration*

Of the total number of administrative staff of the institution (47), those who returned the questionnaire incomplete were excluded, leaving a total of 22 people.

All the information was handled in a data matrix, where measures of central tendency were calculated.

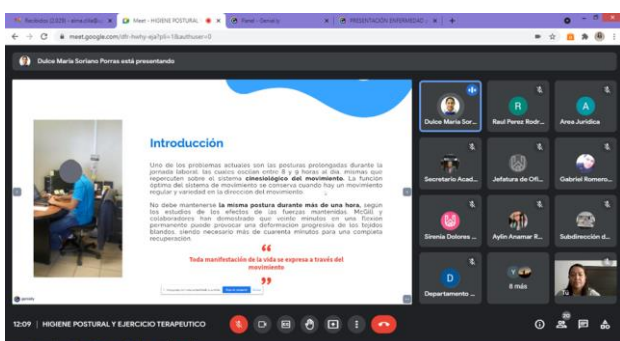
For the development of the study, informed consent was requested from each participant with prior authorisation from the management.

**Results**

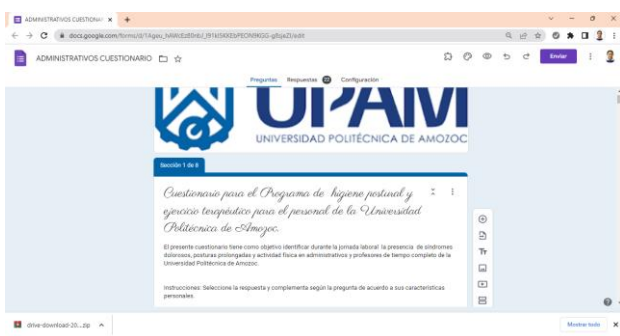
Table 2 shows the descriptive statistics resulting from the application of the Nordico instrument..

Variables	n	%
Total	22	100
Gender		
Female	14	63.6
Male	8	36.4
<b>Age group</b>		
20 - 29 años	8	36.4
30 - 39 años	5	22.7
40 - 49 años	2	9.1
50 - 59 años	4	18.2
60 - 69 años	2	9.1
Major of 70	1	4.5
<b>Function</b>		
Administrative	16	72.7
Teaching and administrative	6	27.3
<b>Working hours</b>		
1 a 8 h	11	50.0
8 a 12 h	8	36.4
12 a 15 h	3	13.6

**Table 2** Sample variables  
*Source: Own Elaboration*



**Figure 1** Virtual Nordico questionnaire briefing  
*Source: Own Elaboration*



**Figure 2** Cuestionario Nordico Google forms  
*Source: Own Elaboration*

95.5% of the study subjects reported having presented pain in some body area, only 1 study subject (4.5%) reported not presenting any type of discomfort.

Regarding the anatomical regions where they report discomfort, the highest frequency is in the neck and shoulder with 59.1% in both cases, followed by the lumbar region with 40.9%. This is detailed in Table 3.

Anatomical regions	n	%
Total	22	100
Collar		
No	9	40.9
Yes	13	59.1
		100.0
<b>Shoulders</b>		
No	9	40.9
Yes	13	59.1
		100.0
<b>Elbows or forearm</b>		
No	19	86.4
Yes	3	13.6
		100.0
<b>Face</b>		
No	21	95.5
Yes	1	4.5
		100.0
<b>Head</b>		
No	14	63.6
Yes	8	36.4
		100.0
<b>Lumbar region</b>		
No	13	59.1
Yes	9	40.9
		100.0
<b>Dorsal region</b>		
No	19	86.4
Yes	3	13.6
		100.0
<b>Hips</b>		
No	15	68.2
Yes	7	31.8
		100.0
<b>Knees</b>		
No	17	77.3
Yes	5	22.7
		100.0
<b>Ankles/feet</b>		
No	19	86.4
Yes	3	13.6
		100.0
<b>Wrist/hand</b>		
No	16	72.7
Yes	6	27.3
		100.0

**Table 3** Anatomical regions

Source: Own Elaboration

With regard to laterality, 40.9% report pain on both sides of the body, followed by 18.2% on the right side of the body and 13.6% on the left side of the body.

The main factor attributed to this pain is prolonged posture (45%), followed by movements, stress and the furniture they use.

It can be identified that the pain varies from a generally moderate to severe intensity, according to a VAS scale, the prevalence of pain threshold ranges from 3 to 9, with the threshold perceived at 6/10 VAS being the highest reference by the sample.

Similarly, 54.5% of the workers report that the pain episodes last an average of 24 hours, 31.8% can last from 1 to 7 days, despite the fact that the discomfort has not yet led to incapacity, and most of them have not received specialised treatment for the control of this discomfort, but 40.9% resort to massage of the affected area and 22-7% to the administration of a drug as a way of reducing the pain.

72.7% of the study subjects report that their work does not require an activity of moderate intensity that involves a slight acceleration of breathing or heart rate, however 54.5% mention that in their free time they practice some activity of moderate intensity that involves a slight acceleration of breathing or heart rate .

100% of the study subjects agree to participate during their working day in a programme of postural hygiene and therapeutic exercise for the reduction and prevention of pain and improvement of their posture, having 45 minutes of their working day available for this purpose.

### Acknowledgement

To the HEI (Higher Education Institution) and the participating staff for identifying this health need within the work environment of the administrative staff, as well as the valuable work of the team.

**Conclusions**

From these data, it can be concluded that the majority of people have presented pain during their work stay, being the predominant anatomical regions neck, shoulder and lumbar region followed by other joints of the extremities, on the other hand the incidence of pain is referred at the end of the working day, persisting from 1 to 7 days, and the predominance involves the dominant side of the body, the factors to which the presence of these painful syndromes is attributed are prolonged posture, seated activities, repetitive movement, furniture distribution, work space and the lack of knowledge and implementation of postural hygiene as well as ergonomics adapted to their context.

Fortunately, the impact of the fourth industrial revolution, where digitalisation has generated challenges in the treatment of occupational health and safety (International Labour Organisation (ILO, 2019), and at national level the NOM-036-1-STPS-2018 standard, has generated reflection on strategies that include training, monitoring and implementation of programmes that contribute to occupational health where physiotherapy can be integrated through the design of programmes that include postural hygiene, therapeutic exercise, ergonomics adapted to the work context by means of a functional evaluation aimed at this type of musculoskeletal disorders, since although the discomfort has not interfered in their work activities, the objective is to influence from a preventive perspective that allows preserving movement, functionality and avoiding in the long term important alterations in the structure that limit function and generate the need for treatment and incapacity for work.

It is worth mentioning that the same population accepts the importance of implementing programmes that contribute to the preservation of health.

**References**

- Cabezas-García, R., y Torres-Lacomba, M. (2018). Prevalencia de trastornos musculoesqueléticos relacionados con el trabajo en profesionales de los servicios de rehabilitación y unidades de fisioterapia. *Fisioterapia* (Madrid. Ed. impresa), 40(3), 112–121. <https://www.elsevier.es/es-revista-fisioterapia-146-articulo-prevalencia-trastornos-musculosqueleticos-relacionados-con-S0211563818300154#:~:text=El%2091%2C8%25%20de%20los,en%20los%20C3%BA%20meses.>  
<https://doi.org/10.1016/j.ft.2017.12.004>
- European Agency for Safety and Health at Work (EU-OSHA)(2019). Work-related musculoskeletal disorders: prevalence, costs and demographics in the EU. European Risk Observatory. Report. ISBN: 978-92-9479-145-0 [https://osha.europa.eu/es/publications/msds-facts-and-figures-overview-prevalence-costs-and-demographics-msds-europe.](https://osha.europa.eu/es/publications/msds-facts-and-figures-overview-prevalence-costs-and-demographics-msds-europe)  
<https://osha.europa.eu/es/publications/work-related-musculoskeletal-disorders-msds-statistics> doi:10.2802/66947
- Flores-Villavicencio, M., González, P., Troyo, R., Valle, A., Muñoz, A., y Vega M., (2004). Efectividad de las técnicas de relajación en la disminución del dolor crónico. *Investigación en Salud*, VI(2), 75-81. <https://www.redalyc.org/pdf/142/14260204.pdf>
- GBD 2016 Disease and Injury Incidence and Prevalence Collaborators (2017). Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet* (London, England), 390(10100), 1211–1259. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(17\)32154-2/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(17)32154-2/fulltext)  
[https://doi.org/10.1016/S0140-6736\(17\)32154-2](https://doi.org/10.1016/S0140-6736(17)32154-2)
- Instituto Nacional de Seguridad e Higiene en el Trabajo (INSHT). (2012). El trastorno musculoesquelético en el ámbito laboral en cifras. <https://www.insst.es/documentacion/catalogo-de-publicaciones/el-trastorno-musculosqueletico-en-el-ambito-laboral-en-cifras>

IMSS (2022) ELSSA.  
<https://www.imss.gob.mx/sites/all/statics/elssa/docs/Linea2/L2-21-vigilancia-salud.pdf>

Montero-Marín, J., Asún, S., Estrada, N., Romero, R., y Asún, R. (2013). Efectividad de un programa de estiramientos sobre los niveles de ansiedad de los trabajadores de una plataforma logística: un estudio controlado aleatorizado. *Atención primaria*, 45(7), 376–383.

<https://www.sciencedirect.com/science/article/pii/S0212656713001248?via%3Dihub>  
<https://doi.org/10.1016/j.aprim.2013.03.002>

Montiel, A. (2011). Higiene Postural Y Ergonomía En El Ámbito Laboral. Recuperado el 20 de diciembre de 2022 de <https://books.google.com.mx/books?hl=es&lr=&id=UEqMAwAAQBAJ&oi=fnd&pg=PT18&dq=related:drZi8dAYQEcJ:scholar.google.com/&ots=kkeQRUjeB4&sig=lQqPvcYNHRCt87SK3JSbE3HLLsw#v=onepage&q&f=false>

Organización Internacional del Trabajo [OIT]. (2019, 26 de diciembre). Seguridad y Salud en el Centro del Futuro del Trabajo: [https://www.ilo.org/safework/events/safeday/WCMS\\_687617/lang--es/index.htm](https://www.ilo.org/safework/events/safeday/WCMS_687617/lang--es/index.htm)

Organización Internacional del Trabajo [OIT]. (2013, 30 de noviembre). *Comunicado de prensa del 26 de abril 2013*. [https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS\\_211645/lang--es/index.htm](https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_211645/lang--es/index.htm)

Organización Mundial de la Salud [WHO] (2022, 26 de diciembre) Sensibilizando sobre el estrés laboral en los países en desarrollo. [http://apps.who.int/iris/bitstream/handle/10665/43770/9789243591650\\_spa.pdf;jsessionid=F1B290A0790E92F1D493974CF9D3E5F8?sequence=1](http://apps.who.int/iris/bitstream/handle/10665/43770/9789243591650_spa.pdf;jsessionid=F1B290A0790E92F1D493974CF9D3E5F8?sequence=1)

Secretaría del Trabajo Previsión Social [STPS]. (2018). Las enfermedades de trabajo y los trastornos músculo-esqueléticos por ejercicio o motivo del trabajo, en México. [https://trabajoseguro.stps.gob.mx/bol079/vinculos/notas\\_6.html#](https://trabajoseguro.stps.gob.mx/bol079/vinculos/notas_6.html#)

Shirley A. Sharman (2005) Diagnóstico y tratamiento de las alteraciones de movimiento Paidotribo. pp (11-53). [https://issuu.com/marinavarro2/docs/diagn\\_c3\\_b3stico\\_y\\_tratamiento\\_de\\_l](https://issuu.com/marinavarro2/docs/diagn_c3_b3stico_y_tratamiento_de_l)

WCPT (2019) Descripción de la fisioterapia declaración política. [https://world.physio/sites/default/files/2021-05/PS-2019-Description-of-PT-Spanish\\_0.pdf](https://world.physio/sites/default/files/2021-05/PS-2019-Description-of-PT-Spanish_0.pdf)

Instituto de salud pública de Chile [ISP]. (2022, 26 de diciembre) Cuestionario Nórdico estandarizado de percepción de síntomas músculo esqueléticos. <https://www.ispch.cl/sites/default/files/NTPercepcionSintomasME01-03062020A.pdf>