Prevalence of Lumbar and Cervical Pain in Industrial and Construction Workers: A Case Study in Ecuador

Miguel Altamirano-Erazo[1]* and Ana Belén Veintimilla-Gualotuña[1]

[1]Facultad de Posgrados, Universidad de las Américas, Quito 170503, Ecuador

*Corresponding author: miguel.altamirano.erazo@udla.edu.ec

Abstract

The health of workers in the industrial and construction sectors can be affected by ergonomic and physical risks. This cross-sectional study conducted in Ecuador in 2021 aims to establish the prevalence of lumbar pain associated with working conditions in workers in these sectors. A total of 207 workers from the construction and industrial sectors were selected, and a control group of administrative workers was used. Two questionnaires were applied, one on work and health conditions in Latin America and another Nordic questionnaire adapted to each sector. Results show a high prevalence of lumbar pain (40.58%) associated with the male sex, more paid jobs, working in construction-related sectors, and handling loads. Additionally, a high prevalence of neck pain (35.74%) was found, especially in administrative personnel. Results suggest the need for preventive measures to reduce lumbar and cervical pain, such as improving ergonomic conditions and implementing injury prevention training programs.

Keywords: Construction, Lumbar Pain, Ecuador, Occupational Health.

Prevalencia de Dolor Lumbar y Cervical en Trabajadores Industriales y de Construcción: Un Caso de Estudio en Ecuador

Resumen

La salud de los trabajadores en los sectores industrial y de la construcción puede verse afectada por una serie de riesgos, principalmente de tipo ergonómicos y físicos. El objetivo de este estudio descriptivo de corte transversal realizado en Ecuador en 2021, es establecer la prevalencia de dolor lumbar asociado a las condiciones de trabajo en los trabajadores de estos sectores. Para llevar a cabo este estudio se seleccionó a un total de 207 trabajadores de los sectores de la construcción e industrial, y se utilizó un grupo de control compuesto por trabajadores administrativos. Se aplicaron dos cuestionarios, uno de condiciones de trabajo y salud en Latinoamérica y otro cuestionario nórdico adaptado a cada uno de los sectores. Los resultados del estudio indican una alta prevalencia de dolor lumbar (40.58%) en los trabajadores, y se encontró que esta prevalencia está asociada con el sexo masculino, un mayor número de trabajos remunerados, pertenecer a sectores asociados a la construcción y manipular cargas. Además, se determinó una alta prevalencia de dolor de cuello (35.74%) especialmente en el personal administrativo. Los resultados sugieren la necesidad de adoptar medidas preventivas para reducir la prevalencia de dolor lumbar y cervical en el lugar de trabajo,

como la mejora de las condiciones ergonómicas y la implementación de programas de capacitación en prevención de lesiones laborales.

Palabras clave: Construcción, Dolor Lumbar, Ecuador, Salud Ocupacional.

Prevalência de dores lombares e cervicais em trabalhadores industriais e da construção civil: um estudo de caso no Equador

Resumo

A saúde dos trabalhadores dos setores industrial e da construção civil pode ser afetada por uma série de riscos, principalmente ergonômicos e físicos. O objetivo deste estudo transversal descritivo realizado no Equador em 2021 é estabelecer a prevalência de dores lombares associadas às condições de trabalho nos trabalhadores desses setores. Um total de 207 trabalhadores dos setores de construção e industrial foram selecionados para realizar este estudo, e um grupo de controle de trabalhadores administrativos foi utilizado. Foram administrados dois questionários, um sobre condições de trabalho e saúde na América Latina e outro questionário nórdico adaptado a cada um dos setores. Os resultados do estudo indicam uma alta prevalência de dores lombares baixas (40,58%) nos trabalhadores, e verificou-se que esta prevalência está associada ao sexo masculino, um maior número de empregos remunerados, pertencentes a setores associados à construção e à movimentação de cargas. Além disso, foi encontrada uma alta prevalência de dores no pescoço (35,74%), especialmente no pessoal administrativo. Os resultados sugerem a necessidade de medidas preventivas para reduzir a prevalência de dores lombares e cervicais baixas no local de trabalho, tais como a melhoria das condições ergonômicas e a implementação de programas de treinamento na prevenção de lesões ocupacionais.

Palavras-chave: Construção, Dor nas Costas, Equador, Saúde Ocupacional.

1. Introduction

According to the World Health Organization (WHO) [1] musculoskeletal diseases have a high prevalence worldwide; about 1710 million people worldwide have suffered an event related to musculoskeletal disorders. Musculoskeletal symptoms are considered one of the most relevant factors at the time of need for rehabilitation worldwide because they represent 17% of disabilities worldwide. In addition, musculoskeletal symptoms not only provide a deterioration at the level of the muscular and skeletal systems but also produce a deterioration in functional capacity and mental health. Low back pain is one of the most common musculoskeletal diseases globally, with an approximate prevalence of 70%. According to various studies, 70 to 85% of people worldwide have suffered some condition or event related to low back pain. Of these, 80% improve during the first week without complications and only 10% progress to chronicity [2]. Additionally, chronic low back pain, defined as lower back pain for more than three months, is the first to reduce the collaborator's quality of life.

An observational, descriptive study, carried out in 12,024 workers from Central America, aimed to establish the prevalence of musculoskeletal symptoms. It obtained as a result a prevalence of 87%, where the cervicodorsal (34%), upper limbs (31%) and lumbar region (22%) were established as frequent body locations. In a cross-sectional trial that was carried out in the city of Barranquilla, Colombia, it was possible to show that 82% of musculoskeletal symptoms were located in the lower back [3]. Low back pain not only affects the quality of life of the collaborator, but also significantly decreases the productivity of the company. In North American countries, low back pain has established itself as the second cause of work impediment worldwide,

where one in five cases of low back pain progresses to chronicity. This establishes higher spending on health and decreased labor productivity and decreased daily activities.

Low back pain is associated with many factors, categorizing it as a multifactorial disease. Among these factors are the innate characteristics of the collaborator, physical resistance, joint ability, age, sex, height, and overweight, among others. Occupational factors include excessive work, static postures, inappropriate twisting and flexing of the trunk, excessive lifting and movement, repetitive work, and vibrations [4]. In the study by [5], a high prevalence of low back pain could be observed in the collaborators, with migrant workers being the ones with the highest prevalence of low back pain (80%) compared to the locals (42%). This is due to the effort-reward imbalance, 82% for migrants and only 19% for locals. In [6] the working conditions of 349 people who attended the trauma area in Valencia, Spain, was analyzed. The main result was a positive correlation between the manual lifting of loads and the days of disability, without counting the age and gender of the participants. In addition, it was possible to observe that the collaborators who carry out load lifting had an excessive work overload and a low economic situation.

According to [7], there is a positive correlation between manual load handling and disability, with a 66% prevalence of absenteeism due to low back pain. In addition, he observed that only 39% of the workers participating in this study had received training on this topic. Likewise, there are studies in which a statistical significance could not be determined between low back pain and the type of work, such as the study by [8]. In this research with 745 people, there was a high prevalence of low back pain (60%) in workers, regardless of the load.

1.1. Low back pain in the Ecuadorian construction sector

A high percentage of low back pain has been evidenced in workers in the construction sector; In a study in which 19,441 workers participated, the prevalence of low back pain could be determined at 26.4%; From this result, it was evidenced that the highest percentage belonged to the construction sector and cleaning workers, according to [9]. In a study by [10], 140 workers from a land company participated, and a high prevalence of low back pain was evidenced, establishing a percentage of 55%; it was possible to determine a high prevalence of shoulder pain with 31.4 %. In addition, it was possible to establish a statistical relationship, where it was determined that people with a BMI greater than 25 percent are more likely to have a picture of low back pain; in addition, a statistical relationship was established between years of work and low back pain. In another descriptive cross-sectional study carried out on 100 workers in Spain who presented low back pain sedentary lifestyle with a prevalence of 47%, overweight or obese with 56%, and lifting loads with 42%; It was also established that the workers who presented lower job satisfaction are the ones who presented the most significant number of days of absence due to low back pain, according to [11].

Another cross-sectional investigation, carried out in the city of Peru, with the participation of 900 workers, determined employee and work conditions related to the presentation of low back pain in 9 work areas exposed to risk factors (Sharon Inga, Karen Rubina, 2021). Where it was obtained as data, a 98% prevalence of low back pain, which was primarily found to be associated with the male sex (p<0.04), the construction sector (p<0.01), at an advanced age (p<0.01) and a more significant number of work hours performed (0.01), in addition, a statistically significant association could be observed between low back pain and work incapacity.

The percentage of low back pain in Ecuador has not shown a range different from that established in studies worldwide. In a cross-sectional study carried out in an Ecuadorian oil company with the participation of 102 male workers aged between 30-40 years, a prevalence of musculoskeletal diseases of 74.2% was established using the global standardized Nordic questionnaire [13[12]. Where a prevalence of 64.7% of low back pain, 43.1% of back pain, 37.3% of cervical pain, and 26.5% of shoulder pain was evidenced, data very similar to those obtained at the level in another descriptive trial, which was carried out in the city of Cuenca, 56 workers

from a meat food sale and distribution company participated, obtaining a high prevalence of musculoskeletal symptoms at the level of the thoracolumbar spine (76.78%). , followed by neck pain (48.2%) and wrist or hand pain (30.35%); it was also established that operating personnel have a higher risk of suffering musculoskeletal problems compared to administrative personnel, who presented a protective factor, according to [13].

In another cross-section, whose objective was to see the prevalence of low back pain in cleaning workers associated with forced postures at work, it was possible to determine a prevalence of 77% where a statistical association with the forced posture was evidenced. However, this study presented a population that was not so significant, but the values obtained coincide with global trends, and this is according to [14].

This article consists of four sections, including the introduction in section 1. The methodology is presented in section 2, and the results in section 3. The discussion is shown in section 4.

2. Methodology

2.1. Participants

Workers in sectors associated with construction and industrial sector in Ambato and Quito, Ecuador. Five companies participated, including a hardware company, a heavy material construction company, a poultry farm, a paint manufacturing and distribution company, and a finishing material manufacturing and distribution company, which were selected for their work history.

For this investigation, all the workers were selected, with the participation of 211 workers. Of these, four workers were excluded for not complying with the appropriate work time in the company; this is greater than 12 months. Establishing a total population of 207 workers, which were divided into two groups for comparison and study, in the first group was the administrative staff, managers, assistant managers, clerks, accountants, secretaries, and treasurers, among others—the second comprised operational personnel, where they found warehouse workers, storekeepers, stevedores, and cashiers. The administrative staff of the sectors above would be formed as a comparison group.

2.2. Inclusion and exclusion criteria

Due to their education status, 15 workers needed help to answer their online questionnaire, which, once completed, was transcribed into the digital form for subsequent data collection. In one of the questionnaire questions on conditions and health at work in Latin America, five erroneous data were obtained due to poor structuring of the question, resolved at the time of tabulating the data.

2.3. Data collection instruments technique

As an instrument for data collection, the online survey was used, which was based on the questionnaire on working conditions and health in Latin America (National Survey of working conditions) and the Nordic questionnaire [15], adapted to each of the sectors, both industrial and construction. The Microsoft forms virtual platform was used for the definitive collection of the surveys due to the accessible data collection. Direct contact with workers was also avoided, thus avoiding crowds, and reducing the spread of the current pandemic.

2.4. Definition of variables

The variables used in this research that seeks to find the prevalence of low back pain and musculoskeletal symptoms, extracted from the questionnaire on working conditions and health in Latin America and the Nordic questionnaire are:

2.4.1. Variables of the questionnaire on working conditions and health in Latin America

(i) Occupation: administrative, operational; (ii) sex: female, male; (iii) age: ≥20-29, 30-39, 40-≤50; (iv) level of education: primary education, higher education; (v) number of jobs: 1 job, 2-4 jobs; (vi) number of working

hours: 2-14 hours, 41-70 hours; (vii) work sector: industrial, construction; (viii) working time in years: 1-10 years, 11 to 31 years; (ix) type of business contract: fixed, temporary; (x) working day: daytime, rotating; (xi) usual work position: foot: yes, no; (xii) sitting: yes, no; (xiii) walking: yes, no; (xiv) squat: yes, no; (xv) knees: yes, no. (xvi) inclined: yes, no; (xvii) usual work task: (xviii) handling loads: yes, no; (xix) forced postures: yes, no; (xx) exert forces: yes, no; (xxi) reach tools: yes, no; (xxii) regular work time: less than 1 minute: yes, no; (xxiii) greater than 1 minute yes, no; (xxiv) ways of working: working comfortably: yes, no; (xxv) necessary movements: yes, no; (xxvi) change of positions: yes, no.

2.4.2. Variables standardized Nordic questionnaire

Pain 12 months: neck, shoulders, hands-wrist, thoracic spine, lumbar spine, hips-legs, knees, ankles-feet: yes, no.

Pain 7 days: neck, shoulders, hands-wrist, thoracic spine, lumbar spine, hips-legs, knees, ankles-feet: Yes, No; Work disability: neck, shoulders, hands-wrist, spine, lumbar spine, hips-legs, knees, ankles-feet.

2.5. Data processing

The statistical analysis of this study used Epi info version 7 as the leading platform. An analysis of measures of central dispersion was performed on the quantitative variables (mode, median, mean, standard deviation, and variance) of the quantitative variables; For the qualitative variables, absolute and relative frequencies were analyzed.

A detailed statistical analysis was carried out, performing an adequate crossing of variables and establishing a bivariate and multivariate analysis; the quantitative variables were transformed into qualitative ones to continue analyzing the data obtained.

3. Results

According to the data obtained, it can be seen that the majority of the participating workers belonged to the operating sector (74.39%), establishing an approximate relationship of 3 to 1, which could be considered as a possible bias when carrying out an exhaustive comparison of data. The predominant sex was male, with 148 (71.50%). The average age of the workers was established at 42 years, being able to appreciate that the majority of the workers were young adults aged between 20 and 39 years, with a prevalence of 65.22%. Regarding education, 64.73% of the workers have a basic level of education; of these, 124 (80.52%) are operational area employees, and most administrative staff have higher education (81.13%). Most of the participating workers have only one job, 190 (91.76%), are salaried 196 (94.96%), and belong to the industrial sector 145 (70.05%). Concerning the other working conditions, it can be seen that the operational workers are the ones that are primarily at risk since 149 (96.75%) do work standing up, 145 (94.16%) work walking, 146 (94.81%) do the handling of loads, and 147 (95.45%) carry out force activities in their daily work.

Regarding the prevalence of musculoskeletal discomfort, neck pain, shoulder pain, and low back pain were the most prevalent symptoms. After 12 months, chronic low back pain was evidenced in administrative staff (30.19%), in operational staff (44.16%), with a p value <0.07, shoulder pain 41.51% in administrative staff and 69.48% in operational staff, with a value p= 0.14, in which it is evident that there is no statistically significant relationship. At the same time, neck pain has shown a statistical association with a p value <0.01. Osteomuscular symptoms were studied at seven days to corroborate the existence of recent pain, in which neck pain has shown a statistical relationship (p=0.02), where administrative staff (37.74%) have been the most affected.

In the present study, it has been possible to determine that low back pain has been the musculoskeletal symptom with the highest prevalence of incapacity for work during the 12 months. There is a statistically significant relationship (p<0.01), mainly in operational personnel (30.52%).

When analyzing the information, it can be observed that the working conditions associated with the presence of neck pain at 12 months are: belonging to the operational sector (p<0.01), being between 20-39 years of age (p<0.01), having higher education (p<0.01) and in terms of the work structure, carrying out their activities walking (p<0.01) and exerting strength (p<0.01), in terms of low back pain it has not been possible to determine statistical significance, for the appearance of early neck pain at seven days we have to belong to the operating sector (p=0.03), to be female (p=0.02), to be between 20 and 39 years of age (p<0.01), and in As regards the structure of work carrying out forces (p<0.01), as regards low back pain, statistical significance could not be determined. Regarding the presence of incapacity for work at 12 months, it was evidenced that the male sex defines disability due to neck pain (p<0.02), being between 20 and 39 years of age (p<0.01), and in Regarding the work structure, carry out the activities walking (p<0.01) and standing (p=o.03). Regarding work incapacity and low back pain, it has been possible to determine that it is associated with belonging to the operational sector (p<0.01), having an age between 20 - 39 years (p<0.01), having a primary education (p <0.01) and regarding the work structure, handling loads (p<0.01) and performing forces (p<0.01). Although it has been shown that the comparison groups are different, the association between low back pain and work factors could not be determined; work disability has taken on great importance in the study.

When performing simple logistic regression on the variables, occupation 2.36 (CI 1.24-4.47), and age 2.65 (CI 1.29-5.42), are statistically significant with these variables and neck discomfort within the last 12 months. The possibility of developing discomfort in the cervical region is 2.36 times higher in operational workers than in administrative workers and 2.65 times higher if they are between 30 and 39 years of age. Considering the logistic regression of the variables age and work performed with force, they are statistically significant with these variables and discomfort at the shoulders and lumbar spine level. The possibility of developing discomfort at the level of the shoulder region is 2.51 times higher if the workers are between 30 and 39 years of age, and in the lumbar spine, it is 3.61 times higher if the workers are in that age range. In the adjusted model, occupation 2.38 (CI 1.01-5.60) and age 2.33 (CI 1.09-4.96) show a statistically significant association with these variables and neck discomfort within the last 12 months. This corroborates the relationship of these variables with discomfort in the cervical area, as observed in the crude OR.

In simple logistic regression, the variables show occupation 2.13 (CI 1.09-4.19), sex 2.15 (IC1.11-4.15), age 2.31 (CI 1.09-4.86), are statistically significant, with these variables and neck discomfort within of the last seven days. The possibility of developing neck discomfort in the previous seven days is 2.13 times higher in operational workers, 2.15 times higher in males, and 2.31 times higher in workers aged between 30 and 39. Like the variable age 2.51 (CI 1.22-5.13) and shoulder discomfort within the last seven days; such as the variables age 3.61 (CI 1.62-8.14), work performed with force 1.23 (CI 1.41-4.64) and discomfort in the lumbar spine within the last seven days. In the adjusted model, occupation 2.38 (CI 1.01-5.60) and age 2.33 (CI 1.09-4.96) are statistically associated with these variables and neck discomfort in the last seven days. This corroborates these variables' relationship with neck discomfort, as observed in the crude OR.

Regarding the sex variable, 3.16 (CI 1.09-9.15) is statistically significant, with neck discomfort that prevented him from working in the last 12 months. The possibility of developing this work impediment is 3.16 times higher in male workers. However, in the adjusted model, the habitual standing work posture variable is 0.05 (CI 0.01-0.81), and discomfort in the lumbar spine that prevented him from working in the last 12 months demonstrated a protective factor for those who carried out their work in this way.

4. Discussion

The participating population was varied since five companies participated, highlighting a painting company, a hardware company, a poultry company, and a heavy material construction company. These companies carry out different types of activities. Although they are not the same for each company, most of the activities they

share are force majeure, such as the warehouse area, stevedores, and workers. This shows a high prevalence of musculoskeletal symptoms in the lumbar spine (40.58%), followed by pain in the neck (35.74%), shoulders (33.33%), wrist-hands (33.33%), thoracic spine (23.18%), hip- legs (23.18%), knees (21.25%) and ankles and feet (8.21%).

Although the results obtained are not as highly prevalent as in other studies, such as [3], with a 59% prevalence of low back pain related to the global trend (70 to 60%), the results obtained do detail a significant prevalence of low back pain, as well as the study [16], which used the same standardized questionnaire, getting a prevalence of low back pain between the range of 12.7% - 24.6% of the participating countries. A prevalence of low back pain and shoulder pain was demonstrated, although symptoms may be due to several factors which would not be related to each other. However, when making a deeper analysis, a higher percentage of low back pain was manifested in workers (44.16%) and a higher prevalence of neck pain in administrative personnel (50.94%). This trend may possibly be due to the various activities carried out by the workers, which predisposes to the appearance of this symptom (p=0.07). At the same time, the administrative staff performs more office activities in which they are carried out in a sitting and standing position without exerting considerable physical effort (50.94%). These data agree with several studies carried out, such as that of (Sharon Inga, Karen Rubina, 2021), where a high prevalence of low back pain (77%) was highlighted, presenting considerably in construction workers (p<0.001). There is also the study by [10] that obtained a prevalence of low back pain of 55% and the study by [13], which obtained a majority of 48.2% of neck pain in a meat sales and distribution company, which It is predominantly made up of administrative staff.

Neck pain, on the other hand, was also present in our study, where a significant prevalence (35.74%) was highlighted in the administrative staff (50.94%). These data agree with another study carried out in Ecuador, which was carried out on workers from a State University and used the same standardized questionnaire for data collection. In this, all the staff work seated, as in our study, obtaining a high prevalence of (26.68%) [17]. Regarding the sociodemographic factors and the work factors that were related to the appearance of low back pain, we have the male sex (p<0.01) with a CI. 0.54-1.84), to a greater number of paid jobs (p0.03) with a CI. (0.13-1.34), belonging to sectors associated with construction (p 0.03) with a CI. (0.52-1.69) and manipulate charges (p 0.01) with a CI. (1.41-4.64). Data that agrees with several studies carried out such as the study by [11], which determined a statistically significant relationship between low back pain, male gender (p<0.01) and manual handling of loads (p=0.04). This is the case of the study by (Sharon Inga, Karen Rubina, 2021), which established the same statistical relationship between the male sex (p=0.04), greater workload (p<0.01), and belonging to sectors associated with the construction (p<0.001), with the appearance of low back pain; data consistent with this investigation.

In relation to work absenteeism, a statistically significant relationship (p<0.01) was evidenced with low back pain, which in a higher percentage belongs to operational workers (30.92%), before administrative workers (9.43%). No statistical relationship could be found between neck pain and work absenteeism. These data obtained could be visualized in the study by [3], where 43% of the workers had an impediment to work due to the musculoskeletal symptoms presented. The study by [18] also determined a statistical relationship between low back pain and work absenteeism (p<0.001).

Although most studies agree with the data obtained, such as [19], where they established a high prevalence of low back pain in adolescents (39.8%), while our study determined a low percentage of low back pain in young people. According to [20], in addition to determining a low prevalence of low back pain (30.9%), it was also verified that the female sex (60.2%) and in the administrative staff (p=0.01) are discordant data with the present investigation [19].

5. Conclusions

A high percentage of low back pain has been manifested in blue-collar workers, associated with the male sex, with more paid jobs in construction and handling loads. Data that agrees with several studies carried out worldwide establishes a pattern that must be modified to avoid its high prevalence. In addition, it has been possible to demonstrate a high prevalence of neck pain in administrative workers; this could be determined by the working conditions that this type of worker presents. These data show that implementing a standardized questionnaire in Ecuador to obtain statistical data is possible.

Due to the high prevalence of low back pain and neck pain, it is suggested to carry out an educational intervention, both in the operational staff and the administrative staff, to minimize the presence of these symptoms as much as possible and thus reduce the risk of an occupational disease, which will lead to lower productivity and higher health spending. In future work, it is proposed to carry out a more exhaustive study on the subject to delve deeper into the possible risk factors that could generate the appearance of low back pain. These could be physical traits, such as the worker's weight and height, social characteristics, such as coexistence with co-workers, the workload, and the level of job satisfaction perceived by each worker.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Conflicts of Interest

The authors declare no conflict of interest.

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Orcid

Miguel Altamirano-Erazo iD https://orcid.org/0000-0001-9649-230X