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EPIDEMIOLOGICAL STUDY OF THE PREVALENCE OF LOW BACK PAIN IN SPINE SURGEONS IN BRAZIL

ESTUDO EPIDEMIOLÓGICO DA PREVALÊNCIA DE LOMBALGIA EM CIRURGIÕES DE COLUNA NO BRASIL

ESTUDIO EPIDEMIOLÓGICO DE PREVALENCIA DE LUMBALGIA EN CIRUJANOS DE COLUMNA EN BRASIL

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ABSTRACT

Introduction: Low back pain is defined as pain, muscle spasm, or stiffness between the L1 and L5 vertebrae, below the lower margin of the twelfth rib and above the upper gluteal fold, and may or may not be associated with pain radiating to the lower limbs. Objective: To determine the prevalence of low back pain in spine surgeons. Method: A non-randomized quantitative cross-sectional clinical study was carried out in a sample of 95 spine surgeons in Brazil, with the application of the Oswestry and visual analog pain scales, in addition to a structured questionnaire for the characterization of the participants. Results: Among the studied population, 69.5% were orthopedists, 30.5% were neurosurgeons, and the mean age of the sample was 46 years (±10.6), with neurosurgeons being older than orthopedists. Regarding BMI, the majority (77.8%) were overweight or obese, and seventy-six percent performed physical activity. The prevalence of low back pain was 58.9%. No relevant differences were found in the time spent weekly in surgeries between those who had low back pain and those who did not (p = 0.364). Mean pain intensity was 2.0 (SD = 2.2), statistically (p = 0.025) higher in orthopedists (2.3) when compared to neurosurgeons (1.3). Regarding the ODI score, 98.2% of the surgeons had a minimal disability (0-20%) for daily activities. Conclusion: The prevalence of low back pain in spine surgeons is high and is associated with mild inability to perform daily activities. ***Level Of Evidence IV; Non-Randomized Quantitative Cross-Sectional Clinical Study.***

Keywords: Low Back Pain; Surgeons; Occupational Risks; Ergonomics.

RESUMO

Introdução: A lombalgia é definida como dor, espasmo muscular ou rigidez entre as vértebras L1 e L5, abaixo da margem inferior da décima segunda costela e acima da prega glútea superior, e pode ou não estar associada à dor que se irradia para os membros inferiores. Objetivo: Determinar a prevalência de lombalgia em cirurgiões de coluna. Método: Foi realizado um estudo clínico transversal quantitativo não randomizado em uma amostra de 95 cirurgiões de coluna do Brasil, com aplicação das escalas Oswestry e visual analógica da dor, além de questionário estruturado para a caracterização dos participantes da pesquisa. Resultados: Dentre a população estudada, 69,5% eram ortopedistas e 30,5% eram neurocirurgiões e a idade média da amostra foi de 46 anos (±10,6), sendo que os neurocirurgiões eram mais velhos que os ortopedistas. Em relação ao IMC a maioria (77,8%) estavam com sobrepeso e obesidade e setenta e seis porcento realizavam atividade física. A prevalência de lombalgia foi de 58,9%. Não foram encontradas diferenças relevantes no tempo gasto semanalmente em cirurgias, entre quem tinha ou não lombalgia (p = 0,364). A intensidade média da dor foi de 2,0 (DP = 2,2), sendo estatisticamente (p = 0,025) maiores em ortopedistas (2,3) quando comparados aos neurocirurgiões (1,3). Em relação ao escore do ODI, 98,2% dos cirurgiões apresentaram incapacidade mínima (0-20%) para as atividades diárias. Conclusão: A prevalência de lombalgia em cirurgiões de coluna é grande e está associada com incapacidade leve para atividades cotidianas. ***Nível de Evidência IV; Estudo Clínico Transversal Quantitativo não Randomizado.***

Descritores: *Dor Lombar; Cirurgiões; Riscos Ocupacionais; Ergonomia.*

RESUMEN

Introducción: La lumbalgia se define como dolor, espasmo muscular o rigidez entre las vértebras L1 y L5, por debajo del margen inferior de la duodécima costilla y por encima del pliegue glúteo superior, y puede o no asociarse a dolor irradiado a las extremidades inferiores. Objetivo: Determinar la prevalencia de dolor lumbar en cirujanos de columna. Método: Se realizó un estudio clínico transversal cuantitativo no aleatorizado en una muestra de 95 cirujanos de columna en Brasil, con la aplicación de las escalas de dolor de Oswestry y analógica visual, además de un cuestionario estructurado para la caracterización de los participantes. Resultados: Entre la población estudiada, el 69,5% eran ortopedistas y el 30,5% neurocirujanos y la edad media de la muestra fue de 46 años (±10,6), siendo los neurocirujanos mayores que los ortopedistas. En cuanto al IMC, la mayoría (77,8%) presentaba sobrepeso u obesidad y el setenta y seis por ciento

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realizaba actividad física. La prevalencia de dolor lumbar fue del 58,9%. No se encontraron diferencias relevantes en el tiempo dedicado semanalmente a las cirugías, entre los que tenían lumbalgia y los que no (p = 0,364). La intensidad media del dolor fue de 2,0 (DP = 2,2), siendo estadísticamente (p = 0,025) mayor en traumatólogos (2,3) que en neurocirujanos (1,3). En cuanto a la puntuación ODI, el 98,2% de los cirujanos tenían incapacidad mínima (0-20%) para las actividades diarias. Conclusión: La prevalencia de lumbalgia en cirujanos de columna es alta y se asocia a incapacidad leve para realizar las actividades cotidianas. ***Nivel de Evidencia IV; Estudio Clínico Transversal Cuantitativo no Aleatorizado.***

Descriptores*: Dolor de la Región Lumbar; Cirujanos; Riesgos Laborales; Ergonomía.*

INTRODUCTION

Low back pain is defined as pain, muscle spasm, or stiffness between the L1 and L5 vertebrae, below the lower margin of the twelfth rib and above the upper gluteal fold, and may or may not be associated with pain radiating to the lower limbs.[1]

It is classified according to duration, origin, and presence of neurological impairment. It can be acute (duration of less than six weeks), subacute (duration of 6 to 12 weeks), and chronic (duration of more than 12 weeks).[2] Its origin can be organic (mechanical--degenerative, non-mechanical, inflammatory, infectious, metabolic, neoplastic, or secondary to the repercussion of systemic diseases) or non-organic (secondary to Munchausen's syndrome, simulated low back pain with the direct and conscious interest of secondary gains and psychosomatic low back pain).[3] Most low back pain is acute, of mechanical origin, and does not present complications such as loss of function. About 20% of people affected by acute low back pain develop chronic low back pain, with persistent symptoms within one year.[4] There are several risk factors for low back pain, including age, educational level, smoking, obesity, pregnancy, sedentary lifestyle, psychosocial factors (stress, anxiety, depression), social class, and work-related factors, such as the workstation; exposure to vibrations, cold, high noise; localized mechanical pressure; postures; musculoskeletal mechanical load; static load; task invariability, cognitive demands and organizational and psychosocial factors related to work.[5]

It is one of the most common health problems and affects from childhood to senescence, with prevalence from 35 to 55 years old.[6] It represents the third major cause of low quality of life, behind ischemic heart disease and chronic obstructive pulmonary disease in the USA.[4] It generates occupational, social, and economic impact.[7] Epidemiological studies indicate that 70% to 85% of the population will have some episode of back pain in their lifetime[8] and that more than a quarter of adults have had some episode in the last three months.[4]

Occupational low back pain is the largest single cause of work-related health disorder (37% of low back pain is attributed to occupational risk factors) and absenteeism (responsible for large economic loss), accounting for approximately one-quarter of premature disability cases and temporary or permanent work incapacity.[3,5] In the United States, approximately 149 million workdays are lost yearly due to low back pain, with a total indirect cost of $100-200 billion annually through lost wages, productivity, and legal and life insurance expenses.[6]

Repetitive strain injuries and work-related musculoskeletal disorders are, by definition, injuries resulting from overuse imposed on the musculoskeletal system and lack of time for recovery.[5]

In the health field, many surgeons have experienced some work--related injury, such as cervical stenosis, lumbar hernia, and carpal tunnel syndrome, given that one of the major ergonomic problems during surgical procedures is body posture, usually accompanied by repetitive movements of the upper extremities, increased muscle activity and prolonged static postures of the head and spine, which can cause musculoskeletal fatigue. After open surgeries, about 30% of surgeons report pain and stiffness in the shoulders, neck, and lower back.[9] These pains and injuries result in leave and early retirement,[10] as well as decreased job satisfaction and productivity.[11]

Occupational symptoms are important as they can provide awareness of the ergonomic deficiencies of the surgical environment and highlight their potential consequences, ultimately promoting workplace improvements.[10] A cohort study noted that ergonomic interventions improved return-to-work rates for long-term sick patients.[12] However, other studies and analyses have indicated that ergonomic interventions are ineffective in preventing low back pain, necessitating multidisciplinary work with workers, managers, ergonomists, physicians, and the scientific research community.[13]

Thus, due to the complexity of care, professional requirements, and the limited number of scientific studies focusing on health professionals, particularly spine surgeons, this work aims to update data on low back pain and correlate with sociodemographic and occupational aspects, allowing awareness of ergonomic deficiencies in the surgical environment and the prevention of its consequences, through a multidisciplinary approach.

The main objective of this study was to estimate the prevalence of low back pain in spine surgeons and secondarily to determine the sociodemographic characteristics of spine surgeons; to relate the average time spent in surgery weekly, by the participants, with the referred frequency of low back pain presented and to verify the degree of restriction in daily activities, caused by low back pain, through the Oswestry questionnaire.

MATERIAL AND METHODS

A non-randomized quantitative cross-sectional clinical study was conducted on a sample of 95 spine surgeons from Brazil voluntarily, recruited through the Brazilian Spine Society of the Orthopedics and Neurosurgery specialties database. All participants signed an informed consent form. The Research Ethics Committee approved the article (CAAE: 59917822.7.0000.0066). The Oswestry Disability Index (ODI),[14] the Visual Analogue Pain Scale (VAS), and a structured questionnaire were applied to characterize the participants of the study regarding age, gender, body mass index (BMI), comorbidities, physical activity, surgical specialty, time in surgery, position in surgery, the average duration of surgeries performed and whether the surgeries are usually open or minimally invasive.

The ODI was chosen due to its importance in assessing disability in patients with low back pain and its high reliability (retest = 0.99) and consistency (Cronbach's $\alpha = 0.87$).[15] The VAS was chosen due to its practicality and ability to determine pain intensity.

Spine surgeons from Brazil, from the Orthopedics and Neurosurgery specialties, of both sexes, over 18 years old, literate, and without ethnicity restriction, were included in the study. Those on sick leave during the data collection period and those with congenital spinal deformities were excluded.

The questionnaires were applied from July to August 2020 through an electronic form. Initially, the data obtained through the questionnaires were transferred to an Excel spreadsheet. Subsequently, descriptive and statistical analyses of the variables were performed, relating the weekly surgical time to low back pain. Pearson's chi-square, Mann-Whitney, and Student's t-tests were used to assess association.

RESULTS

Of the 95 spine surgeons interviewed, the mean age was 46 years (SD = 10.6), with significantly higher mean values (p = 0.024) in the group of neurosurgeons (49.8 years) when compared to orthopedists (44.3 years). (Table 1)

As for BMI, 77.8% were overweight and obese. 76.8% performed

physical activity, with a mean of 4.8 hours per week (SD = 2.6), with significantly more hours of physical activity in neurosurgeons (4.9h) than in orthopedists (3.1) (p = 0.037). Among those who practiced physical activity, we found that the mean BMI was considerably lower (p = 0.041) in those who performed such activities (27.4) than the mean of those who did not (29.5). (Table 1)

Regarding comorbidities, 58.9% had no pathological history, and 41.1% had: 23.1% systemic arterial hypertension (SAH), 5.3% diabetes mellitus (DM), 3.2% dyslipidemia, 3.2% obesity, and 2.1% smoking. We saw that neurosurgeons (58.6%) have a significantly higher proportion of comorbidities than orthopedists (33.3%) (p = 0.021). No significant differences were seen between those with comorbidities and those without physical activity (p = 0.632). (Table 1)

The prevalence of low back pain in the population was 58.9% (Figure 1), and no significant differences were found in the proportions between the two surgical specialties (p = 0.064). When comparing time spent weekly in surgery, no relevant differences were found between those with and without low back pain (p = 0.364). Among surgeons with low back pain, the mean intensity found through VAS was 2.0 (SD = 2.2). However, no relationships were found with weekly time in surgery (Correlation = - 0.032 with p = 0.760). Pain intensity values were significantly higher in orthopedists (2.3) when compared to neurosurgeons (1.3) (p = 0.025).

Among the study population, 69.5% were orthopedists, and 30.5% were neurosurgeons. The mean number of years of surgical experience was 18.3 years (SD = 10.8), with a mean time spent in weekly surgeries of 10.3h (SD = 6.5). We observed that neurosurgeons (23.2) had significantly higher values in years of surgical practice than orthopedists (16.2) (p = 0.003). 100% of respondents answered that they stand most of the time during surgeries, 48.4% usually perform open surgeries, 14.7% have minimally invasive surgeries, and 36.8% do both.

In surgeons with low back pain, the ODI found that 98.2% of surgeons had minimal disability (0-20%) and 1.78% had moderate disability (21-40%) for daily activities. (Table 2)

Table 1. Characteristics of spine surgeons (n=95).

Characteristic	N = 95
Age in years	46 ± 10.6
Female	4 (4.2)
Male	91 (95.8)
IMC	27.9 ± 4.1
Comorbidities	
None	56 (58.9)
HAS	22 (23.1)
DM	5 (5.3)
Dyslipidemia	3 (3.2)
Asthma	1 (1.1)
Smoking	2 (2.1)
Coronary heart disease	1 (1.1)
SAHOS	1 (1.1)
Coxarthrosis	1 (1.1)
Depression	1 (1.1)
Crohn's disease	1 (1.1)
Drop	1 (1.1)
Hypothyroidism	1 (1.1)
Physical activity	73 (76.8)
Neurosurgeons	29 (30.5)
Orthopedists	66 (69.5)

Data presented as mean ± standard deviation or n(%). BMI = body mass index (weight ÷ height^2). OSAHS = Obstructive Sleep Apnea and Hypopnea Syndrome.

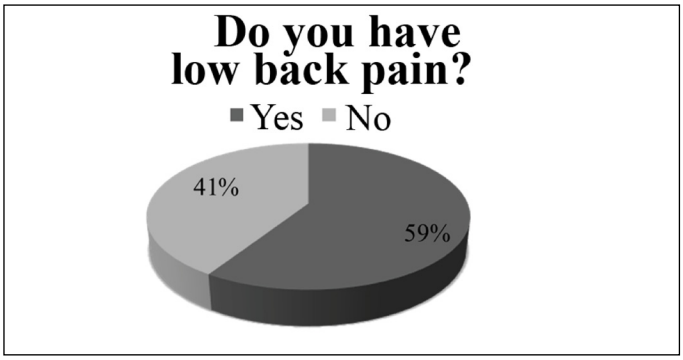

Figure 1. Percentage of responses to the question "Do you have low back pain?" of the Structured Questionnaire.

DISCUSSION

According to the WHO, the prevalence of nonspecific low back pain is 60 to 70% in industrialized countries, peaking between the ages of 35 and 55.[6] Nascimento and Costa report that "low back pain is a condition that can affect up to 84% of people at some point in their lives".[16]

According to Fonseca, the prevalence of musculoskeletal symptoms among surgeons varies between studies. However, some report up to 81.5% of pain, with low back pain being one of the most prevalent.[17] Of the respondents in this study, 58.9% of spine surgeons reported low back pain; however, although the values agree with the prevalence described in the literature, we must emphasize that the sample refers to spine surgeons, not representing the general population.

In 1984, Richard Schilling proposed the Schilling Classification, which establishes a cause-and-effect relationship between pathologies and work. He grouped the pathologies into 3 (three) groups (Figure 2), and low back pain could be classified as Schilling II, when work was considered a contributing factor to its onset, or Schilling III, when work was considered an aggravating factor of a pre-existing disorder.[3] Mechanical, postural, traumatic, and psychosocial causal factors are the most associated with occupational low back pain.[3]

Individual and occupational risk factors are involved in the genesis of low back pain. The most frequent individual risk factors are age, gender, body mass index, muscle imbalance, muscle strength capacity, socioeconomic conditions, and the presence of other diseases. The most identified occupational risk factors involve incorrect movements and postures resulting from inadequacies in the work environment, the operating conditions of the available equipment, and the ways of organizing and performing the work.[3]

The operating room presents unfavorable ergonomic conditions for the surgeon due to the body positions adopted for long periods during surgeries, among them static positions of the neck and trunk.[17] According to Nguyen et al., most musculoskeletal complaints were correlated with longer surgery times.[18] Despite what is described in the literature, no correlations were found between surgical specialties (p = 0.064) or between the average time spent weekly in surgeries and low back pain (p = 0.364) in this study.

It was found that in developed countries where the physical demand at work is less intense, the prevalence of low back pain is twice as high compared to the population of low-income countries, where the physical demand at work is higher. Based on the findings of this study, a sedentary lifestyle seems to have a greater impact on low back pain when compared to intense physical work.[19]

Despite the data in the literature, when we compared the presence of low back pain to the performance of physical activity by surgeons in this study, we did not find significant differences between them (p = 0.610). When we compared the pain intensity of surgeons with low back pain between those who performed and those who did not perform physical activities, we also did not find relevant differences (p = 0.582).

Regarding the ODI answered by surgeons who had low back pain, 98.2% had minimal disability and 1.78% moderate disability for daily activities. According to Moraes (2003), chronic nonspecific low back pain rarely totally incapacitates a person to perform activities of daily living. However, it can be partially and temporarily limiting and

Table 2. Frequency and percentage of responses in the Oswestry Disease Index Scale questions in surgeons who had low back pain (n=56).

Oswestry	Group with low back pain (n = 56)
	N (%)
Intensity of pain at the time	
Painless	32 (57.14)
Lightweight	23 (41.07)
Moderate	1 (1.78)
More or less intense	-
Very strong	-
Worst imaginable	-
Personal care	
I can take care of myself without causing extra pain	51 (91.07)
I can take care of myself, but it causes me pain	5 (8.92)
It is painful to care for myself, and I am slow and careful	-
I need some help, but I can take care of myself	-
I need help in all aspects to take care of myself	-
I don't get dressed, I shower with difficulty and stay in bed	-
Weights	
I can lift heavy things without causing extra pain	36 (64.28)
If I lift heavy things I feel extra pain	17 (30.35)
Pain prevents me from lifting heavy things, but I manage if they are well positioned	1 (1.78)
The pain prevents me from lifting heavy things, but I find a way to lift light or lightly weighted things if they are in a position	2 (3.57)
I can only lift very light things	-
I cannot lift or carry anything	-
Floor	
Pain does not stop me from walking	56 (100)
Pain prevents me from walking more than 2 km	-
Pain prevents me from walking more than 1 km	-
The pain prevents me from walking more than a few meters	-
I can only walk with a cane or crutch	-
I stay in bed most of the time and have to drag myself to the bathroom	-
Sitting	
I can sit in any type of chair for as long as I want	29 (51.78)
I can sit in my favorite chair for as long as I like	23 (41.07)
The pain prevents me from sitting for more than 1h	4 (7.14)
Pain prevents me from sitting for more than 30 mins	-
Pain prevents me from sitting for more than 10 mins	-
Pain prevents me from sitting	-
Standing	
I can stand for as long as I want without extra pain	20 (35.71)
I can stand for as long as I want, but I feel a bit of pain	35 (62.5)
The pain prevents me from standing for more than 1h	1 (1.78)
Pain prevents me from standing for more than 30 mins	-
Pain prevents me from standing for more than 10 mins	-
The pain prevents me from standing	-
Sleep	
My sleep is not disturbed by pain	31 (55.35)
Sometimes my sleep is disturbed by pain	25 (44.64)
Because of the pain, I sleep less than 6h	-
Because of the pain, I sleep less than 4h	-
Because of the pain, I sleep less than 2h	-
The pain prevents me from sleeping	-
Sex life	
My sex life is normal and does not cause me extra pain	48 (85.71)
My sex life is normal, but it causes me extra pain	7 (12.5)
My sex life is almost normal, but it is very painful	1 (1.78)
My sex life is very restricted due to the pain	-
My sex life is practically non-existent due to the pain	-
Pain prevents me from having sexual activity	-
Social life	
My social life is normal, and I feel no extra pain	49 (87.5)
My social life is normal, but it increases the degree of my pain	7 (12.5)
The pain does not alter my social life except for preventing me from strenuous activities such as sports.	-
The pain has restricted my social life, and I don't get out of the house much	-
The pain restricted my social life to my home	-
I have no social life due to my pain	-
Travel	
I can travel anywhere without pain	28 (50)
I can travel anywhere, but I feel extra pain	26 (46.42)
The pain is bad, but I can travel for 2h	-
The pain restricts my trips to distances shorter than 1h	1 (1.78)
Pain restricts my trips to the necessary and less than 30 Min	-
Pain prevents me from traveling except to be treated	1 (1.78)
Classification	
Minimum disability	55 (98.21)
Moderate disability	1 (1.78)
Severe disability	-

Category	Examples
I - Work as a necessary cause	Lead poisoning Silicosis Legally recognized occupational diseases
II - Work as a contributing factor, but not necessary	Coronary heart disease Diseases of the locomotor system Cancer Varicose veins of the lower limb
III - Work as a provocateur of a latent disorder or aggravator of an already_established disese	Chronic bronchitis Allergic contact dermatitis Asthma Mental diseases

Figure 2. Classification of diseases according to their relationship with work. Source: Adaptation of Schilling, 1984.[3]

often recurrent. Thus, the data found correspond with the literature. It is important to note that the ODI is more sensitive when applied to individuals with severe disability.[19] It is hardly compared with other studies, as it is usually used to assess improvement in disability pre- and post-surgical procedures.

To prevent occupational low back pain, we need physical (biomechanics, work posture, repetitive movements, occupational safety, and health), organizational (quality management, organizational culture, group work), and cognitive (mental load, stress, training) measures.[3]

Fonseca, in his randomized clinical trial, proposed that the intervention group participated in meetings with physical education professionals to perform physical exercises for strengthening, mobility, and muscle stretching and guidance on the prevention of RSI / WMSD. The control group received information on general health care. Both groups showed improvement in quality of life in functional capacity, vitality, and social aspects; however, only the intervention group showed improvement in pain.[20]

Other studies have proposed similar interventions, such as the adoption of breaks for stretching during surgery and training with exercises to strengthen the abdominal and trunk muscles.[20] Physical exercises are effective in pain therapy and in reducing disability.[3]

The aggregation of multidisciplinarity, with adequate psychological and social support, may involve higher initial costs; however, they will prove to be less expensive in the long run, because of the reduction in the number of medical consultations and lost days of work, as well as lower expenses to the social security system, without prejudice to the patient, but rather, in a single solution that aims, first, at restoring their health.[3]

Thus, due to the scarce literature focused on low back pain in spine surgeons and the importance of the topic for public health, further studies should be conducted to understand the multiple factors related to low back pain and propose prevention measures.

CONCLUSIONS

Overall, the present study concluded that the prevalence of low back pain in spine surgeons is high and that most individuals have a mild disability to perform daily activities. However, the study could not correlate time in weekly surgery with a prevalence of LBP.

All authors declare no potential conflict of interest related to this article.

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