NEUROLOGY

Cite as: Archiv EuroMedica. 2025. 15; 1. DOI 10.35630/2025/15/1.109

Received 22 January 2025;
Accepted 21 February 2025;
Published 24 February 2025

THE EFFECT OF SITTING POSTURE ON THE INCIDENCE AND SEVERITY OF LOW BACK PAIN IN ADULT POPULATION – SURVEY STUDY

Michał Orczyk [1] ✉, ***Martyna Orzechowska*** [1], ***Karolina Jabłońska*** [1], ***Aleksandra Roztoczyńska*** [1], ***Aleksandra Jeńć-Magoń*** [1], ***Piotr Paluch*** [1], ***Karol Leśniewski*** [1], ***Jakub Pudźwa*** [1], ***Kamil Gibczyński*** [2], ***Anita Król*** [2]

[1] *College of Medical Sciences, University of Rzeszow, Poland*
[2] *Fryderyk Chopin University Clinical Hospital in Rzeszow, Poland*

✉ ***m-orczyk@wp.pl***

ABSTRACT

Low back pain is one of the most common complaints worldwide. The modern lifestyle, characterized by a lot of time spent sitting, is one of the main risk factors for the development of back pain. In particular, poor sitting posture and prolonged maintenance of the same position contribute to the overloading of spinal structures, which increases the risk of developing painful conditions.

Aim of the study: The aim of this study was to investigate the relationship between the adult respondents' sitting posture and the frequency and severity of back pain.

Materials and methods: The research material was collected by means of an anonymous self-administered questionnaire involving 261 people aged 18 years and older. The results obtained were analyzed and verified against the scientific literature available in the online database (PubMed, Google Scholar) and statistically processed using Microsoft Office Excel.

Results: A total of 261 people (117 aged 18-45), 171 men and 90 women, took part in the survey. As many as 93% of respondents experienced back pain while or after sitting. It mostly affected the lumbar and sacral spine. Sitting-related pain affected daily functioning in almost 45% of the respondents. In addition, the respondents admitted breaks and exercise as the most common methods to relieve a sitting-induced pain.

Conclusions: We found a strong association between sitting posture and the occurrence of back pain in the adult population. The frequency and intensity of pain is higher among people who spend many hours in a sedentary position without taking care of good posture and comfortable working conditions. The results also suggest the need of education to improve the effectiveness of preventive measures and the quality of life in people with back pain.

Keywords: back pain, sitting posture, back health, LBP

INTRODUCTION

Back pain, and especially low back pain (LBP), is one of the most common health problems in the world, affecting millions of people regardless of age, gender, education or location. Nowadays, it is becoming increasingly difficult to encourage people, including the younger generation, to undertake physical activity in their leisure time. This may result in overloading of the musculoskeletal system, especially the spine. It is therefore no surprise that more and more people are complaining of back pain. In 2020, 619 million people worldwide were affected by back pain, and this figure is forecast to rise to 843 million by 2050. In 2020, back pain was the leading cause of disability worldwide, leading to a significant economic and social burden, and the number of cases is increasing due to an ageing population and an increasing number of overweight people. The increase in spinal pain cases is also linked to risk factors such as smoking, obesity and poor posture. Studies indicate that the aforementioned risk factors influence the chronicity of emerging spinal pain.

With the increasing number of people suffering from back pain, preventive and educational measures are needed to improve the condition of the spine and the quality of life of the population [1, 2, 3, 27]. The vertebral column has key functions in the body, such as stabilization, protection of the spinal cord, support of the body, site of muscle attachment and organ of movement. Its protective function is due to its anatomical structure - the spinal canal surrounded by bony structures and ligaments, the elastic joints of the vertebrae and the presence of intervertebral discs, or more precisely their nucleus pulposus, which absorb shocks. The natural curvature of the spine also plays a role in protection, reducing the transmission of shocks to the skull and brain [3, 4, 5, 23, 25].

Spinal pain can develop from a number of different factors. The spine and its surrounding muscles are a complex structure in which any element can cause pain, and this can also occur due to factors unrelated to the spine (e.g. psychogenic). The most common causes of back pain are degenerative changes resulting from long-term overloading of the spine. Other causes can be congenital defects, inflammation, e.g. in the course of rheumatic disease, cancer, trauma or metabolic disorders and obesity [3, 27, 28, 29, 31]. Sedentary posture plays a key role in the development and exacerbation of back pain, particularly in the lumbar region. Modern lifestyles, which are characterized by prolonged sitting, often in the wrong position, contribute to overloading of spinal structures and the development of painful conditions. An incorrect sitting posture, such as a hunched back position with excessive rounding of the back, leads to an uneven distribution of the load on the vertebrae, intervertebral discs and musculoskeletal structures. In this position, there is increased pressure on the anterior parts of the intervertebral discs, which can cause their degeneration and the occurrence of herniated nuclei. At the same time, the spinal muscles and ligaments are subjected to chronic tension, which leads to their fatigue and weakened stabilizing capacity. The biomechanical aspects of spinal loading in the sitting position are particularly relevant. Studies show that sitting with a rounded back increases pressure on the lumbar intervertebral discs by up to 40% compared to standing. In addition, prolonged maintenance of this position reduces the flexibility of the spinal structures and restricts the flow of nutrient fluids within the intervertebral discs, which accelerates their degeneration. Sitting in an incorrect position can also lead to spinal misalignment, such as functional scoliosis or lumbar hyperlordosis. This results in chronic muscle tension and asymmetry in the working of the muscles that stabilize the spine (back extensor muscles and paraspinal muscles), which exacerbates pain. In the treatment of back pain caused by poor sitting posture, patient education on correct ergonomics while sitting is a key element of prevention and treatment. Regular position changes, the use of back-supportive chairs and taking physical activity breaks are recommended and can significantly reduce the risk of pain [2, 3, 5, 6, 7].

However, the most common treatment for back pain is pharmacotherapy, the use of which has become significantly widespread due to the availability and wide choice of preparations on the pharmaceutical market. The most common group of drugs used for spinal pain are those from the NSAID family, while for more acute patients, drugs that reduce muscle tension (e.g. tyzanidine), weak and strong opioids and drugs used to treat neuropathic pain, such as pregabalin, are often used [8]. Other methods include rehabilitation of patients with spinal pain syndromes and physiotherapy for pain. These methods include physical therapy, which uses physical agents for therapeutic purposes, and kinesitherapy, in which the most important therapeutic aspect is movement performed by the patient alone or with the help of a physiotherapist [3, 8].

Aim of the study: to investigate the relationship between sitting posture and the frequency and severity of back pain, especially in the lumbar and sacral sections, to examine the knowledge of the adult population over 18 years of age on this topic, and to analyze the scientific literature on the relationship between back pain and posture.

Materials and methods: The survey was conducted as a proprietary online questionnaire among a group of 261 adults in January 2025. It consisted of 19 single-choice, multiple-choice and open-ended questions. The first part of the questions related to general information regarding the age, education and health assessment of the respondents. The second part related to questions about back pain itself, sitting posture behavior and measures used to alleviate pain. In addition, a question was asked about the respondents' knowledge of the prevention of back pain with sitting posture.

Results: A total of 261 people over the age of 18 took part in the survey. Considering the age ranges, the respondents surveyed were from the age groups 18-25 (45%), 26-35 (38%), 36-45 (4%), 46-55 (10%) and >55 (3%) (Chart 1).

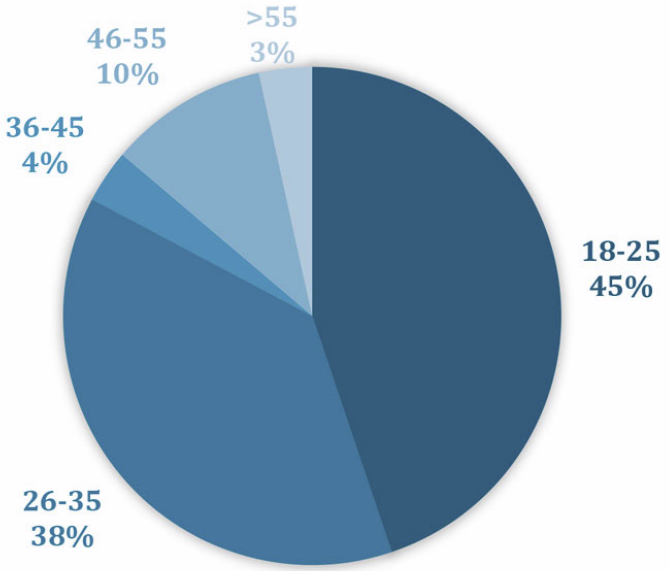

Chart 1 - Age of respondents who took part in the survey.

The study group consisted of 171 (66%) men and 90 (34%) women (Chart 2).

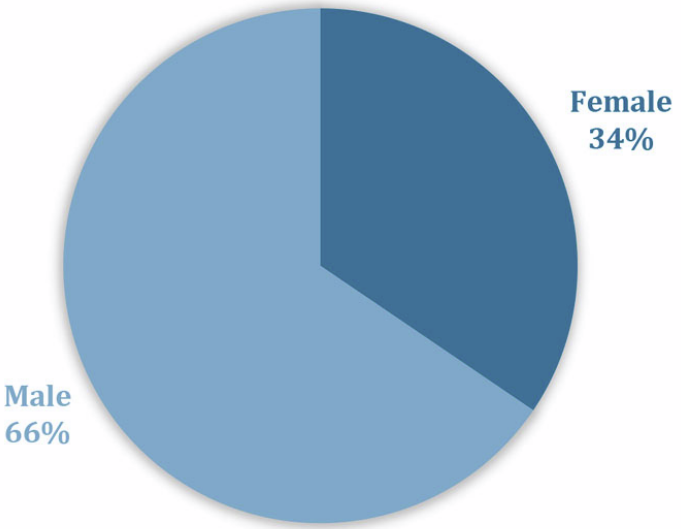

Chart 2 - Distribution of respondents by gender.

Respondents were those with sedentary jobs (48,2%), partially sedentary jobs (44,8% each) and physical jobs (7%).

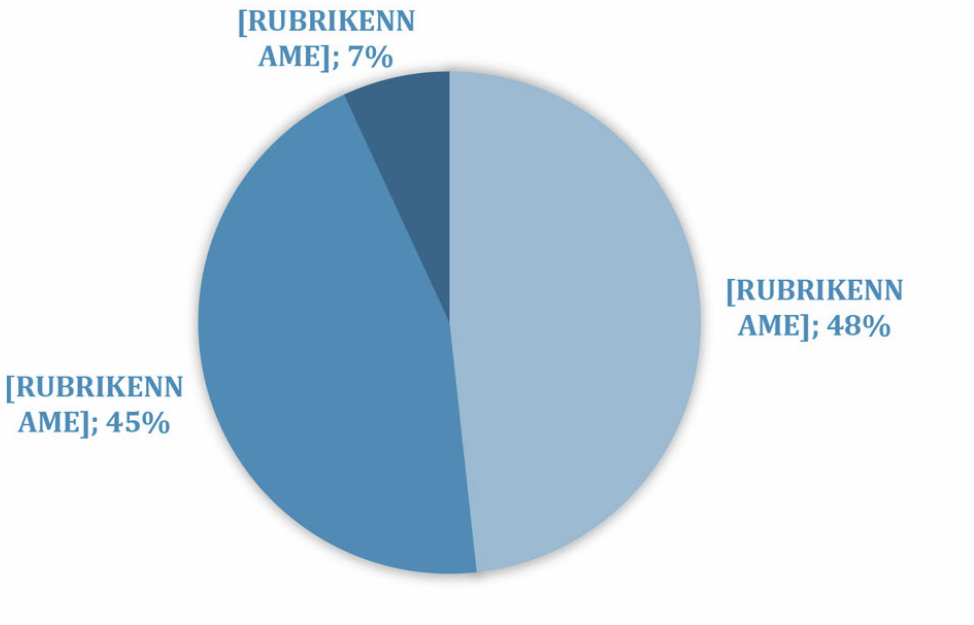

Chart 3 – Respondents' working conditions.

When asked about the daily amount of time spent sitting, respondents indicated 5-7 hours (45%) the most, followed by 2-4 hours (21%), 8-10 hours (17%), >10 hours (14%) and <2 hours (3%) (Chart 3).

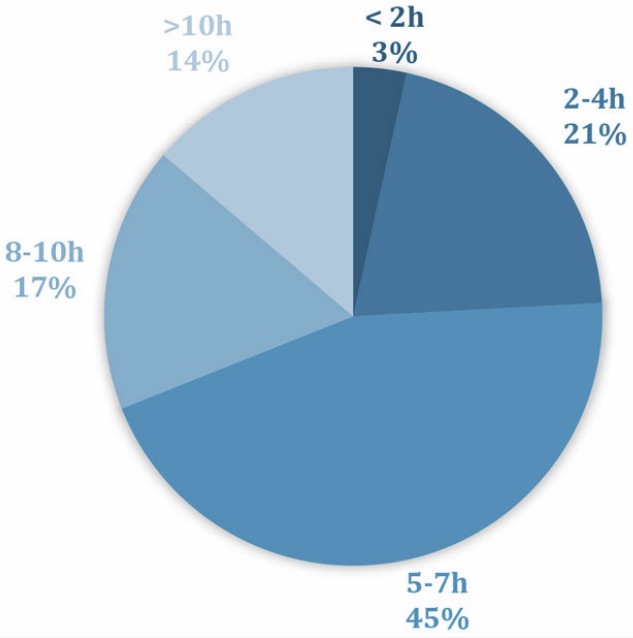

Chart 4 - Amount of time spent by respondents in a sedentary position.

The second part of the questions concerned back pain, sitting posture behavior and measures used to alleviate pain. When asked about knowledge of the pattern of correct sitting posture, 79% of respondents answered in the affirmative, while knowledge of this subject was denied by 21% of respondents. Among the 261 respondents asked about the habit of adopting the correct posture while sitting, no one indicated that they always take care of the correct posture of their body. The remaining respondents indicated that they sometimes try to improve their posture, but not always (126 persons; 48%), rarely pay attention to correct posture (126 persons; 48%) and are never concerned about their posture when sitting (9 persons; 4%).

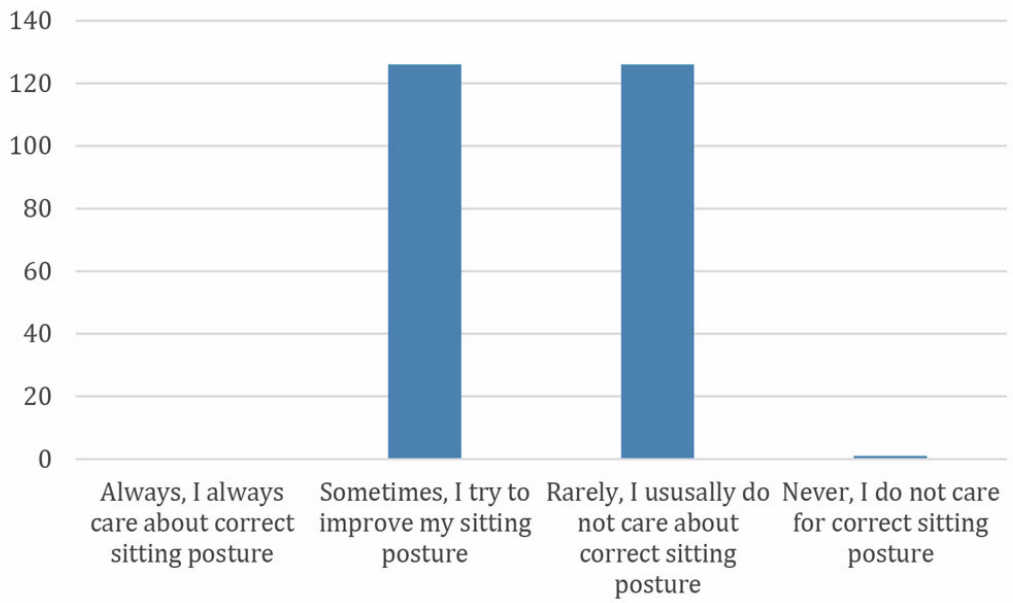

Chart 5 - The habit of adopting the correct posture while sitting.

When asked about the frequency of changing their posture while sitting, respondents indicated that they most often change their posture every 30 minutes (34%), followed by every few minutes (28%), every hour (21%) and rarely or never (17%). 153 respondents indicated that they do not use additional support tools (e.g. cushion, backrest, chair with proper adjustment, lumbar roll) when sitting. The remaining respondents use them sometimes or regularly.

As many as 55% of respondents reported back pain during or after prolonged sitting every day or several times a week. The remaining respondents feel pain rarely (38%) or never (7%) (Chart 4).

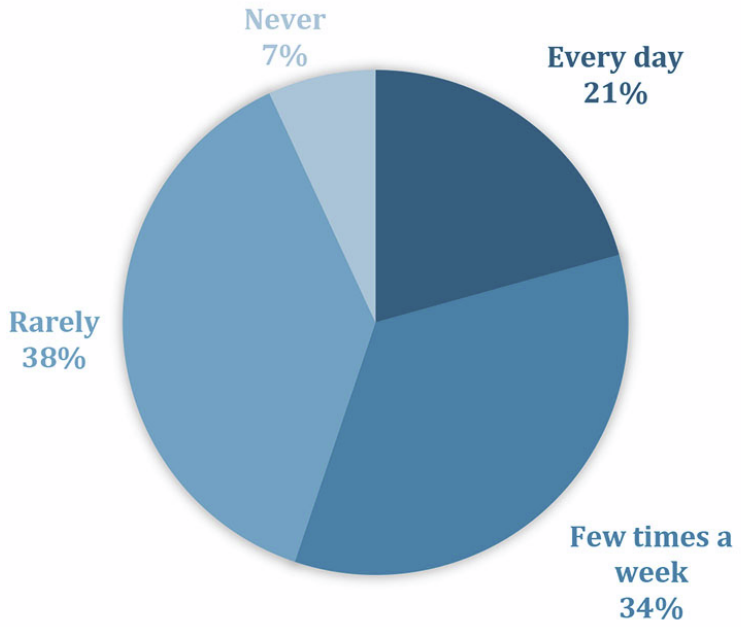

Chart 6 - Perception of back pain during or after prolonged sitting.

A multiple-choice question regarding the spinal segment in which the patient most frequently experiences pain indicated that **the lumbar and sacral segments were the most common** (Chart 7).

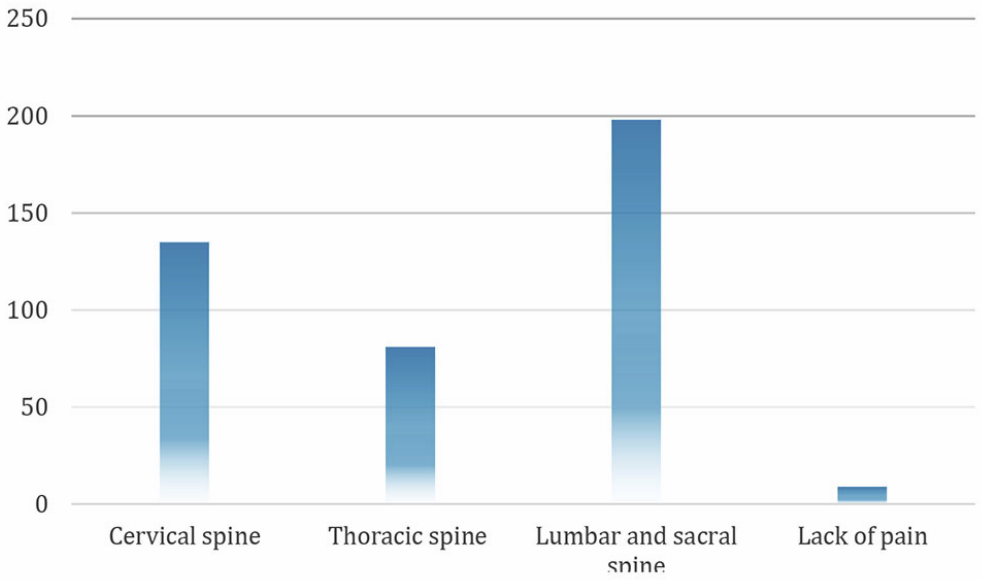

Chart 7 - Presence of pain by spinal segment.

As many as 79% of respondents described their pain as moderate or mild, 17% of respondents described it as severe pain. The remaining respondents reported no pain.

When asked about the duration of pain after prolonged sitting, respondents indicated that it most often lasted a few minutes (45%), several minutes (21%), several hours (17%), and a whole day (14%). The rest reported no pain.

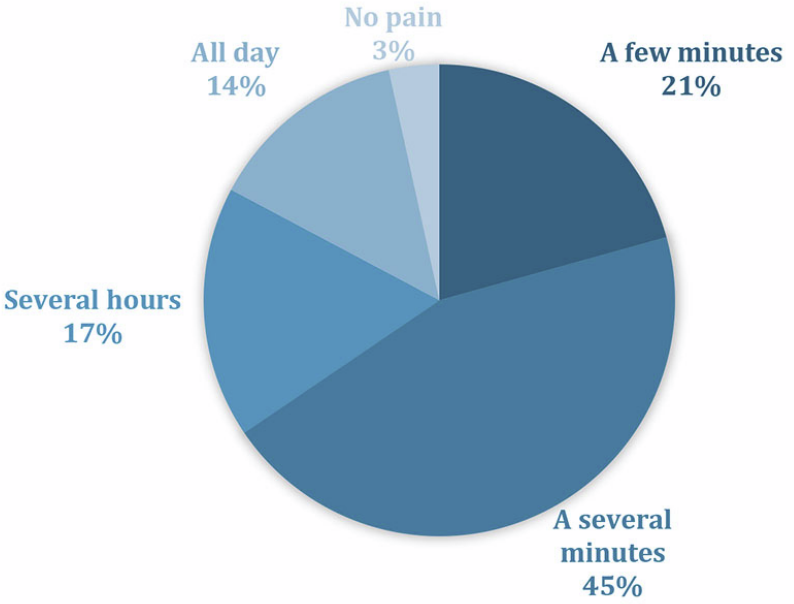

Chart 8 - Duration of pain after prolonged sitting.

Sitting-related back pain affects daily functioning for 45% of respondents, with 31% describing the impact as insignificant and 14% as severely limiting. 55% of respondents noted no impact on daily functioning.

A multiple-choice question about complaints other than pain related to poor sitting posture indicated that 52% of respondents did not experience any additional complaints. The remaining respondents complained of concomitant neurological symptoms such as tingling, pain in the arms or legs and sensory disturbances, reduced mobility of the arms, legs or other parts of the body, and weakness in the arms or legs (Chart 7).

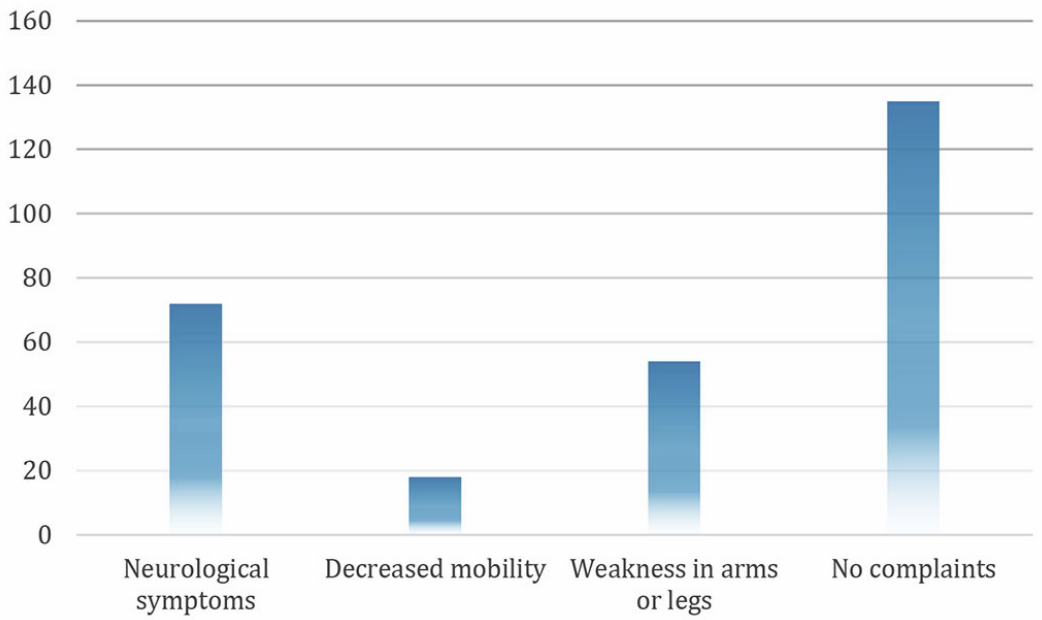

Chart 9 - Other symptoms reported by respondents.

When asked in a multiple-choice question about the methods used by respondents to prevent or alleviate sitting-induced back pain, respondents most frequently indicated taking breaks and changing sitting positions (48%), regular exercise and stretching (35%), and using special cushions or chairs (21%). The remaining respondents indicated methods such as massages or rehabilitation with a physiotherapist and the use of painkillers, among which respondents most frequently mentioned NSAIDs (mainly ibuprofen) and paracetamol. 62% of respondents did not consult their pain complaints with a doctor. 35% of patients went to their doctor with their complaints - 21% of whom received a diagnosis and appropriate pain treatment. When asked about effective methods for preventing back pain, respondents mentioned increasing the number of breaks while sitting, adopting a correct posture, using ergonomic furniture, using cushions or rollers and exercising.

DISCUSSION

Studies show a direct link between prolonged sitting and the incidence of lumbar pain, especially among office workers. Prolonged sedentary posture contributes to an increased risk of pain, particularly in the lower back [7, 14, 23, 26, 27]. Prolonged poor sitting posture leads to muscle imbalance and dysfunction, including the deep spinal muscles such as the multifidus and transversus abdominis, and weakened spinal stability, resulting in increased vulnerability to back pain [7, 17, 23]. The frequency and intensity of pain is clearly higher among people who spend many hours in a sitting position, without taking care of proper posture and comfortable working conditions. Despite the young age of the respondents - the largest group of respondents was between 18 and 25 years old - a high prevalence of back pain in this group was noted. As many as 55% of respondents experienced pain during or after prolonged sitting every day or several times a week, demonstrating the significant impact of a sedentary lifestyle on the health of young adults. The results indicate that back problems do not only affect older people or those with a sedentary workload, but also increasingly younger age groups who may be less aware of the need for prevention and postural care, and this coincides with the available literature [6, 9, 10, 24].

Although as many as 79% of respondents declared knowledge of correct sitting posture, the lack of consistency in its use (100% of respondents do not adopt it regularly) indicates the need for more targeted educational measures. The data collected shows that a significant proportion of respondents experience pain, with the lumbar and sacral spine being the most frequently indicated areas of discomfort. The data shows that the back pain experienced by respondents most often lasts for a few minutes after prolonged sitting (45%). However, in 17% of respondents the pain lasts for several hours and in 14% it lasts all day, which is supported by the results of studies such as 'Sitting Posture During Occupational Driving Causes Low Back Pain' and 'Back pain in the context of the driving profession', in which prolonged sitting while driving at work also led to persistent pain complaints [20, 26]. The variation in the duration of pain experienced by the respondents shows that back pain resulting from poor posture while sitting is often not the rule. The fact that 45% of survey participants noted the impact of pain on their daily functioning, of which 14% described it as significantly limiting, warrants particular attention in a public health context, as pain that worsens and worsens over time can prevent a patient from functioning normally, doing their job and even lead to respiratory dysfunction or disability [1, 13].

Among the most frequently mentioned methods of preventing and relieving pain were taking breaks and changing sitting positions, which were indicated by 48% of respondents. Regular exercise and stretching were used by 35% of respondents, and 21% used ergonomic cushions or chairs. A small group also indicated rehabilitation, massage or the use of painkillers, most often belonging to the group of non-steroidal anti-inflammatory drugs (NSAIDs), which are indeed an effective method of controlling back pain caused by poor sitting posture, although they only act symptomatically and not causally. The literature shows that sports exercises, stretching or breaks from sitting in people with a sedentary lifestyle can effectively reduce musculoskeletal complaints [8, 11, 12, 15, 30]. Nevertheless, the relatively low percentage of people using ergonomic aids (e.g. cushions, backrests) points to the need for increased availability of such solutions in workplaces and better education. The lack of the habit of taking care of the correct posture, combined with the low use of ergonomic tools such as specialized chairs, cushions or lumbar rollers, further contributes to an increased risk of painful conditions [16, 23, 25].

Additionally, younger people may be more likely to develop poor sitting habits, which can lead to more serious musculoskeletal conditions in the long term [6, 10, 24, 25]. Analysis by Victor CW Hoe et al. highlights the impact of ergonomics in reducing musculoskeletal complaints [18]. However, a review paper written by Maurice T Driessen et al. indicates that ergonomic interventions may not be sufficiently effective in preventing or reducing low back and neck pain [22], highlighting the need for more research on this topic. Similar observations were made by the authors of the study 'The Relationship Between Objectively Measured Sitting Time, Posture, and Low Back Pain', suggesting that education alone is not sufficient without adequate ergonomic support in the form of rollers, pillows, etc., and regular breaks and exercise [19]. One of the most worrying results is that as many as 62% of respondents had never consulted their pain complaints with a doctor. These results are in line with the findings of Valentin Markov et al. in whose work the lack of awareness of the consequences of prolonged sitting was also a significant problem [21]. As many as 79% of respondents rated their pain as moderate or mild, which may explain why a large proportion of respondents do not take active measures to alleviate or prevent it. Importantly, for 45% of respondents, back pain affects daily functioning - in most cases moderately, although for 14% it is a significant limitation.

Poor reporting of patients to specialists with their conditions may also result from downplaying the problem, treating pain as an unavoidable consequence of a sedentary lifestyle or a lack of awareness of treatment and prevention options. Meanwhile, the literature suggests that appropriately selected interventions, such as rehabilitation, physiotherapy or changes in habits, can significantly improve the quality of life of people with back pain. Moreover, in addition to abnormal posture, there are many other factors causing lumbar back pain that this study did not address. Back pain, and especially low back pain, is a multifactorial health problem resulting from the interaction of biomechanical, neurophysiological and psychosocial factors. In most cases, spinal pain is described as non-specific, meaning that no specific anatomical structure can be clearly identified as the source of the complaint. In addition to prolonged sitting, the main causes are mechanical overload, resulting from heavy lifting and exposure to vibration in the occupational environment (for example: lifting weights over 25kg or car driving) [20, 26, 27]. Risk factors also include for instance obesity (which becomes a major problem in the world and a civilization disease), physical inactivity, pregnancy, smoking and chronic stress [27,28,29,30,31].

CONCLUSIONS

Our findings indicate that individuals who spend long hours sitting without ergonomic adjustments report significantly higher frequency and intensity of low back pain (LBP). The majority of participants reported experiencing back pain during or after sitting, with the **lumbar and sacral spine** being the most commonly affected areas. Moreover, individuals who spent extended hours in a sedentary position without maintaining proper posture or using ergonomic adjustments reported experiencing pain more frequently and with greater intensity, considering the fact that the majority of the respondents in this study reported sedentary or partially sedentary job with 5 to 7 hours sitting a day.

What is worrying, that almost half of our respondents reporting back pain is in age of 18-25, which indicates that the problem concerns younger generations as well. These results coincide with other literature sources and researches.

However, while our study highlights a significant relationship between sitting posture and LBP, it does not establish causation. Other contributing factors, such as obesity, pregnancy, physical inactivity, previous spinal conditions, and psychological stress, may also influence the prevalence and severity of back pain. The reliance on self-reported data introduces potential biases, including subjective perception and recall limitations.

Additionally, our study also aimed to investigate the awareness of the association between LBP and correct sitting posture among adults. Nearly 80% of respondents claimed to know the correct sitting posture; however, they still did not consistently follow it, which led to recurring ailments. This result suggests that

awareness alone is not sufficient to prevent LBP, and further interventions, including behavioral changes and ergonomic modifications, might be necessary, as well as more comprehensive educational programs on that subject.

Given the widespread impact of LBP caused by abnormal posture while sitting and yet, still insufficient education on that matter, preventive strategies should focus on increasing awareness of correct posture, implementing ergonomic interventions (e.g., adjustable chairs, lumbar support cushions), and ensuring periodic breaks and physical activity. These systemic measures, including workplace ergonomics programs and public health education campaigns, may not only decrease the risk of low back pain and back pain in general, but also improve occupational efficiency and overall quality of life of patients.

Longitudinal or experimental studies would be beneficial for further understanding the causal pathways between sitting behavior and spinal health. Future research should explore practical strategies to bridge the gap between knowledge and behaviour, ensuring that ergonomic recommendations translate into real-world benefits. Due to complexity of the mechanisms leading to LBP it requires a multidisciplinary diagnostic and therapeutic approach, taking into account biomechanical, neurophysiological and behavioral aspects.

FUNDING

No financial support was received.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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