



## Low back pain associated with altered BMI and sedentary lifestyle

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### **ABSTRACT**

Low back pain is a manifestation of pain, muscle spasm or rigidity located below the costal margin and above the lower gluteal fold, associated or not with radiating pain in the lower limb. Second to arterial hypertension, painful conditions of the spine are the second most prevalent chronic disease in the Brazilian population. In about 85%-90% of cases, it is not possible to identify the etiology, and the problem is denominated non-specific spinal disease. Psychological factors, occupational factors, overweight and physical inactivity may be related to a higher frequency of low back pain crises, it can cause also anatomical changes in the spine, for which the treatment with the best results is the practice of physical activity.

**Keywords:** low back pain, BMI, Physical inactivity.

### **1 INTRODUCTION**

Low back pain is characterized by pain, spasm or stiffness located between the costal margin and the lower gluteal fold, it is a very frequent complaint in the population, in addition to culminating in a high rate of absenteeism at work worldwide. Because of this, it is essential that its causes and forms of treatment are discussed.

Two factors can be very important in the genesis of this symptom, namely: high BMI and sedentary lifestyle. These usually cause alterations of the vertebral structures classified as idiopathic, with the intervertebral discs and adjacent musculature being the main sites affected.

There are several therapies that can be used to improve this problem, such as physical exercise, stretching, medications, and invasive procedures.

### **2 DEVELOPMENT**

Low back pain is a manifestation of pain, spasm or stiffness located between the costal margin and the lower gluteal fold, with or without irradiation to the lower limbs. This is a symptom that can be associated with different diseases.<sup>1</sup>

This symptom is one of the most prevalent among the Brazilian population. It is estimated that 18.5% of the Brazilian population over the age of 18 has some diagnosis of spine-related pathology, the number is close to 27 million people. This scenario is reproduced all over the world, with low back pain being the world's leading cause of absenteeism at work.<sup>2</sup>



BMI, on the other hand, stands for body mass index and is a good way to estimate body adiposity. The calculation is done by dividing the weight in kilograms by the height squared in meters. According to the World Health Organization (WHO) and the Ministry of Health, if the value acquired is less than 18.5, the person is underweight, if it is between 18.5 and 24.9, the person is of normal or eutrophic weight, if it is between 25 and 29.9, overweight, between 30 and 34.9 there is obesity grade I, between 35 and 39.9, grade II obesity and above 40 is severe obesity.<sup>3</sup>

The WHO sets daily and weekly physical activity goals according to age group and people who do not meet these goals are considered sedentary. These physical activities consist of any movement performed by skeletal muscle that causes energy expenditure, it can be through domestic activities, work, leisure or even physical exercises themselves. For children between 7 and 17 years old, the goal is 60 minutes of moderate to vigorous intensity activity 3 times a week, most of which is aerobic. Adults between 18 and 64 years old, on the other hand, should practice 150 to 300 minutes per week some moderate-intensity aerobic activity or 75 to 150 minutes of vigorous intensity, coupled with 2 days of moderate-intensity muscle strengthening.<sup>4</sup>

In general, what should be avoided at any age is sedentary behavior, which consists of being awake, but in a sitting or lying position, without performing any activity. A major factor that favors this attitude today is the use of cell phones or other electronic devices.<sup>4</sup>

The etiology of low back pain is very diverse and can be classified into two major groups: those of mechanical origin, which contain trauma, fracture, muscle strain, disc protrusion or herniation, and other mechanical causes; and those of inflammatory origin, which contain neoplasia, infection, ankylosing spondylitis and various inflammatory causes. However, 85% of the cases are known as idiopathic or non-specific low back pain, in these situations the patient does not have any comorbidity such as those mentioned above, but they do have pain in the lower back. Many factors are related to the genesis of this symptom, such as: age, sex, income, level of education, behaviors (such as smoking, alcoholism, poor diet, sedentary lifestyle, among others), obesity and psychological morbidities.<sup>2, 5, 11</sup>

A sedentary lifestyle and a BMI higher than 30kg/m<sup>2</sup> are very important conditions for the genesis of low back pain and, in addition to being important for the onset of pain, they also make the treatment less efficient and longer, due to the anatomical changes caused.<sup>2, 6, 7</sup>

In order to understand these anatomical changes, the anatomy of the spine will be briefly discussed. This is made up of vertebrae and elastic intervertebral discs. In general, vertebrae are made up of: vertebral body (the most robust anterior region, which is the main support of body weight), vertebral arch (formed by the right and left pedicles, which surround the vertebral foramen, where the spinal cord passes) and the seven processes (responsible for the intervertebral joint and muscle fixation). The muscles of the dorsum can be divided into proper (or intrinsic) and extrinsic muscles, the former are responsible for maintaining



posture and controlling the movements of the spine and their main representatives are the erector spinae or long muscles.<sup>8,9</sup>

Between the vertebrae there is the intervertebral disc, it is formed by an external fibrous ring made up of fibrocartilage and an internal gelatinous material called the nucleus pulposus, which gives the disc an elastic characteristic, due to the large percentage of water it contains. This feature allows movement between adjacent vertebrae and shock absorption.<sup>8,9</sup>

Low back pain caused by a sedentary lifestyle can be explained on the basis of the dorsal muscles themselves. Just like any other muscle in the human body, in the absence of stimuli, they become more flabby over time. On the other hand, in order for the person to be able to remain in a sitting position, some of these muscles must remain contracted, so individuals who spend long periods in this position tend to cause a continuous contraction and consequently, muscle fatigue. Both leading to muscle dysfunction, destabilization and misalignment of the spine and, therefore, low back pain.<sup>7,10</sup>

On the other hand, high body weight causes a mechanical overload on the spine, leading to an increase in intradiscal pressure and alteration of this disc, i.e., dehydration and loss of proteoglycans of the nucleus pulposus and degeneration of the external fibrous ring. These changes facilitate the occurrence of bulging and fissure discs, in addition to bringing the adjacent vertebrae closer together and losing part of the mechanical support, which can culminate in a collapsed disc. All of this causes more vertebral instability and inflammation in this region and are reasons for the occurrence of low back pain in people with BMI above normal. The main point of the spine affected is the lumbar region, as this is where most of the weight deposited is concentrated.<sup>6, 8, 9, 11</sup>

A study conducted by the Department of Orthopedic Surgery at the University of Washington evaluated several ways already used in the treatment of low back pain and the result achieved was that physical exercise is the best option for treating this symptom.<sup>13</sup>

According to a survey conducted by the Brazilian Society of Exercise and Sports Medicine, it compared exercises performed with the aid of weights, such as dumbbells and weight machines, and functional exercises, that is, using only the weight of the body itself or elastic bands. The benefits of these practices were compared for 8 weeks and the conclusion was that there is not a big difference in terms of gains compared to the two modalities, both culminate in decreased pain, improved function, abdominal strength and flexibility. In this study, the use of analgesics without the practice of physical activity accompanied by clinical guidance on how to avoid pain crises was also compared to these two modalities, but in the long term, this is not the best way to treat low back pain.<sup>12</sup>

Regarding medications, in addition to analgesics, we have anti-inflammatories and weak opioids, such as tramadol, which can be used. Some studies also suggest the association of anticonvulsants, such as gabapentin, with an opioid, and the mechanism of action of the anticonvulsant decreases the



neurotransmission of pain sensation in the afferent nervous system. In certain situations, the use of muscle relaxants and antidepressants can also be beneficial. However, it is important to highlight that the use of drugs does not have positive effects on flexibility, muscle strength, quality of life or cardiovascular endurance, so it should be avoided, always giving preference to physical activity.<sup>2</sup>

Stretching is an interesting practice for those with low back pain, it is capable of generating biomechanical and sensory changes in the spine. The biomechanical alterations consist of making the muscle fibers and the tissues that surround them more elastic, aiming to reduce passive stiffness and prevent the collagen fibers present in these places from also stiffening, while the sensory alterations consist of increasing the threshold for pain through a mechanism called the gate theory, where the painful stimuli reach the spinal cord in smaller quantities (an effect similar to that of the anticonvulsant).<sup>14, 15</sup>

A very useful modality in this sense is pilates, for its practice it uses, in general, only body weight and elastic bands and in addition to stretching, it also stimulates the strengthening of the dorsal muscles, improving the alignment of the spine and posture of practitioners. The muscle class of the extensors of the spine (includes the erector spinae and the gluteal muscles) are worked a lot, as well as the abdominal muscles, which are also very important for stabilizing the vertebrae.<sup>15th</sup>

There are also therapies that are more invasive and that can be applied in cases of specific low back pain, that is, when its cause is known. We have the infiltration of trigger points, when the pain is of muscular origin; there is nerve root infiltration, in cases where the pain is neuropathic radicular pain; facet block, when pain occurs due to inflammation of the facet joints; risotomy or radiofrequency neurolysis in cases where the facet block relieved pain by 50 to 80%, and could eliminate all pain after the second intervention; And finally, there are some disc procedures that are much discussed, the most recently discovered being the injection of stem cells into the degenerated disc in order to regenerate it.<sup>2</sup>

### **3 GENERAL OBJECTIVE**

The objective of this study is to relate BMI elevation and sedentary lifestyle to low back pain of nonspecific origin.

### **4 METHODOLOGY**

For the elaboration of this study, we used books on Orthopedics and Traumatology and scientific articles available on the Scielo and Pubmed platforms.

### **5 CONCLUSION**

In conclusion, today's society has been suffering a lot from issues related to stress, psychological problems and longer workloads than recommended. These factors increasingly favor the increase in BMI



and a sedentary lifestyle, which, as previously discussed, are important factors for the genesis of low back pain, an increasingly frequent complaint in the population and an important cause of absenteeism at work.

With this in mind, it is necessary that the practice of physical exercise is encouraged, as this is the best way to prevent and treat low back pain because it can act both in reducing BMI and strengthening muscles related to spinal stabilization. Other therapies, such as drug and invasive therapies, are not as effective in reducing pain in the long term as physical exercise.



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