

# Prevention of non-specific low back pain through healthy dynamics. An opinion on applied biomechanics

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## Opinion

Non-specific low back pain is pain with mechanical characteristics (generated by mobilisation of the spine and which disappears with rest) that is located in the lumbar region of the spine and has no apparent cause, and is therefore non-specific. This is the most common primary low back pain, defined as persistent or recurrent pain that cannot be reliably attributed to a pre-existing pathological process or structural pathology. Nonspecific low back pain manifests as a syndrome of isolated or recurrent crises lasting less than three months, not associated with neoplasia, previous trauma, neurological disease or constitutional syndrome.

Biomechanics studies the principles of human body movement, functional anatomy and the mechanical analysis of movement. Mechanics is divided into dynamics and statics. Dynamics is the study of the laws of motion of matter and is divided into kinematics and kinetics. Kinematics is the study of the motions of a system and kinetics is the study of the forces that generate these motions. Therefore, dynamics is the integration of both; and in this case healthy dynamics is the study of the laws of motion (kinematics and kinetics) applied to the well-being of the human locomotor system. The quantitative description of movement in terms of linear and angular kinematics and kinetics in the second and third dimensions is not the aim of this study opinion.<sup>1</sup>

There have long been a large number of studies and treatment methods that have been developed to prevent and treat low back pain, as it is one of the most disabling and frequent in the general population. However, within the vast repertoire of therapies there is a notable absence of a precise and focused description of what may be the most intuitive, feasible, applicable and easy to implement way of preventing recurrences of pain; healthy dynamics. I describe this possible study as the performance of movements, exercises, techniques and care of the lumbar spine, as well as the omission of movements that do not respect the mobility limits of the lumbar spine, generated by the integration of the knowledge of the biomechanics of the spine and the methods of pain prevention, and applied to the involuntary and voluntary daily actions of the patient through the creation of habits and repetitions. This is a topic that needs to be developed, both for this condition and for the musculoskeletal conditions that are the most frequent and cause the most morbidity in the population. Physical medicine and rehabilitation is a relatively new science that has taken its place in medical practice and continues to innovate every day with the applicability of state-of-the-art technologies, however, efforts must not be set aside to take this wonderful knowledge of the biomechanics of the musculoskeletal system and apply it to the branch of prevention, not just cure, of pathologies. The intellect of the medical community that is continually striving to establish the understandable and applicable relationship of these sciences to the population must be put on the map, so that those interested can take advantage of the ways in which our bodies limit themselves, and thus preserve the health of the complex and intricate processes that underlie locomotion.<sup>2</sup>

When discussing non-specific low back pain prevention with the patient, one should always remember the general care for all physiological systems and pathological processes, such as adequate hydration, healthy sleep, daily exercise, smoking cessation, treatment of associated diseases, and weight control through a healthy diet and avoidance of excess ultra-processed foods. The lumbar spine, although functioning as part of a larger entity, has ranges of motion that must be respected, relationships with its adjacent regions when performing movements, a physiological lordosis preservation system and active and passive stabilising mechanisms consisting of various muscles and ligaments that are in constant action throughout the day; all of this to maintain the integrity and stability of the region and to be able to execute the movements that help us recreate, express ourselves, function and contribute to society. The ranges of motion of the lumbar spine range from 52 to 59° of flexion, 15 to 37° of extension, 14 to 26° of lateral extension and 9 to 18° of rotation.<sup>3</sup>

The relationships with its adjacent regions, the thoracic spine and the sacral region, condition the increase or decrease of the physiological lumbar lordosis: any increase in dorsal kyphosis or horizontalisation of the sacrum will lead to an increase in physiological lumbar lordosis by increasing intervertebral joint pressures, so avoiding excessive dorsal kyphosis with an upright posture and positioning the shoulders backwards will contribute to pain prevention; and adopting an upright position, with lumbar support and correct support of the sacral and coccygeal region in sitting contributes to the correct positioning of the lumbar spine for a large part of the population who maintain this position throughout the day. By strengthening the protective systems of the spine, we are talking about exercising the various muscles and ligaments surrounding the spine through targeted exercises. We must also take into account the relationship that walking has with the stability of the lumbar spine, remembering that this region is the intersection between the weight of the entire trunk and upper limbs, distributed to the coxal region and lower limbs which in turn will distribute this weight on the surface, so the position of the feet, the correct execution of walking and the stability of the lower limbs are crucial for the prevention of non-specific low back pain.<sup>4</sup>

In conclusion, the analysis, interpretation and description of the applicability of this information for the patient seems to me to be a successful way to have a global scope to reduce the costs of rehabilitation of recurrent degenerative pathologies in the population through secondary prevention. People's daily movements and exercises involve a series of processes involved in the stabilisation and strengthening of the structures involved in the onset of non-specific low back pain, therefore, educating on how to use these processes to our advantage through healthy dynamics is of vital importance to reduce the symptoms of this pathology and promote a life free of morbidities that affect our function, and in general improve people's quality of life. I think it is wonderful to be able to contribute to the field of medicine with the inspiration to carry out this type of study, as sometimes the most complicated path to follow just needs a little advice to see results. And I hope that soon we will see studies that think globally and in the most remote and inaccessible places of modern medicine and scientific knowledge applied to people in need.

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### Conflicts of interest

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