Low back pain (or lumbago) is both and individual and social issue of greatly relevant proportions, being one of the most diffuse pathologies among people in their working age. Atlas and Nardin (2003) define low-back pain as the most prevalent cause of pain, disability and social cost; in another paper, (Maniadakis, 2000) concludes that “the social cost of low-back pain is higher than every other condition or pathology”.

Moreover, in a study conducted by the OSHA (European agency for safety and health at work) emerges that, in developed countries, 80% of workers suffer muscle-skeletal pathologies, which are the first cause of absence from their working places.

In some countries, the total amount of the compensations paid due to such pathologies reaches the 40%. Known the relevance of this pathology, it becomes important to determine which factors are to be controlled in order to prevent its development; since from 1983 studies, it is concluded that subjects who maintain the sitting posture for prolonged periods (Frymoyer et al., 1983; Heliovaara e Makele, 1991) are one of the categories most exposed to the risk of low back pain.

The sitting position could not be considered as a natural posture for human's morphology, being us called “home erectus”; the vertebral column is composed of 3 main physiological curves, which aim is to provide flexibility and, at the same time, stability to the whole structure, thus been called “a sartie”.

The main biomechanical changes in the spine when a subject assumes a sitting position are:

- decrease of the trunk-thigh angle and consequent flattening of the lumbar curve

- mechanical stress with possible posterior protrusion or extrusion of lower lumbar intervertebral disc, due to an anterior overloading (Keegan JJ et all., 1953).
In the literature there is a common agreement on the hypothesis that an alteration of the lumbar lordosis would result in mechanical stress over the sustain structures of the spine, thus predisposing the subject to the development of dolorous symptoms; this specific case is deeply analyzed and studied by the McKenzie™ method, where the author concludes that a static and prolonged loading would be responsible of deformations of the vertebral column’s soft tissues and the developing of lumbar and/or peripheral pain.

It is also important to take into account the role of erector muscles’ activity in extending the spine and controlling its posture during the sitting position.

Excess of contraction of this district could lead not only to muscular fatigue (with the subsequent risk of contractures, spasms and antalgic symptomatology), but also to an overloading of the inter-vertebral joints, with a significant increase of the mechanical stress over the whole spine (Granata et al., 2000; McGill et al., 2003).

Evidences of the correlation between spine’s muscular activity and the load over vertebral discs are known since '70s studies; the images below, show how significantly the loading over intervertebral discs increases during some common sitting activities, due to the stabilization work done by spinal erector muscles.

More specifically, the biomechanical reason behind this overloading is that muscles express force through a lever arm, which fulcrum is the vertebral disc itself, producing mechanical compression on the opposite side; the higher will be the muscular contraction, the higher the compressive stress over intervertebral discs.

The aim of this study is to quantitatively assess with surface electromyography the effectiveness of the new lumbar support, the back-saver ruby, in preventing the development of low-back pain.

This controlled, randomized study aims to measure differences in the contraction activity of longissimus dorsi muscles while sitting in a common office chair with and without the back-saver Ruby™.

The study included 34 subjects, with an age between 20 and 60 years, asymptomatic and without any previous diagnosis of lumbago; according to McKenzie guidelines, subjects with spondylolysis, spondylolisthesis or spinal stenosis were also excluded.

The muscular activity was measured with surface electromyography, being extensively used in the literature and non invasive.
The acquisition protocol followed the Seniam™ guidelines and was standard across all experiments.

For each subject, for each experimental condition, sEMG signals were conditioned and normalized in amplitude over the maximum voluntary contraction value (MVC); four values were thus obtained for each subject: two for the mean left and right longissimus dorsi with and without back-saver Ruby™; a preliminary Lilliefors test showed a non-Gaussian distribution of the results, which has thus been analyzed with non-parametric statistics.

Data coming from left and right sides has been compared with a Wilcoxon test for paired data, showing no statistically significant differences between the activation of the two sides in each subject in both experimental conditions.

According to Caneiro (2010), for each subject and each experimental condition, left and right values were averaged and aggregated in boxplots showing a significant reduction in the longissimus dorsi activity when sitting with the back-saver Ruby™.

In particular, in this latter condition, the median value of the population was 19.05% lower.

In conclusion, the results of this study show that the back-saver Ruby™ significantly reduces the activity of longissimus dorsi muscles; following the erector spinae rationale, this implies a decreasing of the pressure between vertebrae and prevents back muscles fatigue.

According to these results, we can conclude that the back-saver Ruby™ can help in the prevention or the treatment of low back pain symptoms.

These experimental results support the thousands, positive feedbacks from all people already using this aid and the practice, on which most experts agrees since 50’s, to use a primary back support over the lower lumbar region of the spine in order to maintain its physiological curve. (Keegan JJ et al., 1953).
Being low-back pain a multifactorial syndrome, the use of the aid must always be integrated with the treatment from an expert clinician.

This aid should be used by all subjects at risk of developing low-back pain, in particular of workers spending most of their time sitting on a chair.

*Finally, the unique design of the back-saver ruby allows a chest cage opening and relaxing which lowers the compression over viscera, promoting fluxes from the nervous, lymphatic and cardiac systems.*
**Bibliografía:**


