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INTERDISCIPLINARY PERSPECTIVES ON IMPROVING QUALITY OF LIFE IN ADULTS WITH LUMBAR HYPERLORDOSE

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Abstract: *The present paper addresses, from an interdisciplinary perspective, the improvement of the quality of life in adults with lumbar hypolordosis, highlighting the impact of this postural disorder on physical functionality and psychological state. The biomechanical implications and the effects on daily activities and socio-professional integration are analyzed. The study emphasizes the need for a complex assessment and personalized intervention. Modern methods of diagnosis and monitoring of evolution are presented. Interventions include physiotherapy programs, postural education and neuromuscular reeducation. The results aim to improve symptoms and optimize general functionality in the long term.*

Key words: *lumbar hyperlordosis, interdisciplinarity in intervention, quality of life.*

1. Introduction

The issue of body posture represents a topic of major interest in the field of sports science and physical education, having significant implications on the functionality of the body and the quality of life of the individual.

Lumbar hypolordosis is the reduction or loss of normal physiological curvatures of the lumbar spine. It occurs for several reasons, which can be classified according to the mechanism: structural, muscular, postural or pathological.

In this context, lumbar hypolordosis stands out as a postural disorder characterized by the diminution of the physiological curvatures of the spine, especially the lumbar lordosis. This biomechanical alteration can lead to muscle imbalances, limited mobility and the appearance of discomfort or pain [3], [14].

At the adult level, this condition takes on particular importance, as this stage of life is characterized by intense activity, increased professional demands and continuous adaptation to the requirements of the socio-economic environment [11], [16].

***a.* Postural and lifestyle causes**

Sedentary lifestyle is one of the main factors contributing to the occurrence of lumbar hypolordosis, because prolonged

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sitting or bending positions cause shortening of muscle groups, such as the hip flexors, and weakening of the extensor muscles of the lumbar spine, thus affecting the normal physiological curvature.

Repetitive poor posture, such as sitting in a chair, in front of a computer, or frequent use of a cell phone, can unbalance the lumbar and pelvic muscles, increasing tension in certain areas and diminishing the natural support of the spine. Also, lifting weights without proper technique or performing repeated twisting movements can overstress the intervertebral discs and facet joints, contributing to the loss of lumbar lordosis. These combined behaviors lead to biomechanical changes, muscle stiffness, low back pain, and decreased mobility.

Over time, persistent muscle imbalances can promote the adoption of a permanent compensatory posture, which worsens the lumbar curvature deformity and can generate secondary problems in the hips and thoracic spine.

Lumbar hypolordosis affects not only musculoskeletal function, but also performance in daily activities, exercise capacity and quality of life. Therefore, prevention by correcting posture using specific physical exercises is essential.

Du, S. H., Zhang, H., & Beier, F. (2023) examines how poor posture (including prolonged slouching) leads to reduced lumbar lordosis and spinal instability, and how this is implicated in back pain [7].

Another study states that prolonged periods of sitting incorrect posture are associated with increased lumbar muscle stiffness, which may contribute to postural and biomechanical dysfunctions of the spine [13].

Study demonstrating that lifting/pulling techniques with incorrect postures worsen the strain on the lumbar region and are correlated with back pain, highlighting the importance of proper posture in preventing spinal health impairment [12].

Poor posture, sedentary lifestyle, and excessive use of digital devices contribute to the exacerbation of postural imbalances. Without appropriate intervention, these dysfunctions can progress and negatively impact overall health.

b. Muscular and ligamentous causes

Congenital malformations of the lumbar spine or pelvis are an important cause of lumbar hypolordosis, being present from birth and affecting the physiological alignment of the vertebrae. Shorter anterior vertebrae or abnormalities in the shape of the pelvis can cause a less pronounced lumbar curve, which leads to muscle imbalances and abnormal distribution of loads on the spine [10], [19]. These structural changes often cause compensations in the thoracic or cervical segments, with increased muscle tension and the risk of chronic pain.

Trauma, such as vertebral fractures or dislocations, can also alter the alignment of the spine, reduce lumbar lordosis and generating local instability. In the case of fractures, healing can produce rigidity or permanent changes in curvature, requiring therapeutic interventions to maintain functionality.

Lumbar surgical interventions, including spinal fusions, can intentionally or secondarily modify the structure of the spine, reducing segmental mobility and affecting the physiological curvature. These procedures, although necessary in certain pathologies, can cause an adaptation of the muscles and a change in the distribution of loads on the lumbar spine and pelvis.

Over time, these structural changes can influence overall posture and body balance, increasing the risk of chronic pain and functional limitations. Therefore, careful evaluation of congenital, traumatic, or post-surgical causes is essential for planning rehabilitation interventions and preventing complications. Physiotherapy interventions, corrective exercises, and personalized postural support play a crucial role in ameliorating the effects of these structural changes. In addition, patient education on maintaining proper posture and avoiding overuse can prevent the worsening of hypolordosis.

Overall, a multidisciplinary approach is necessary to restore as much functionality and alignment of the spine as possible. Periodic monitoring of lumbar curves and adapting the therapeutic plan according to evolution are essential strategies in managing these complex situations.

Quality of life is a complex concept that integrates physical, psychological and social dimensions, and is directly influenced by the individual's health status. In the case of people with lumbar hypolordosis, functional limitations and discomfort can affect both daily activities and the level of personal satisfaction [1], [20].

Therefore, addressing this issue requires an integrated perspective, which considers all the factors involved.

Modern interventions emphasize the interdisciplinary nature of treatment, involving collaboration between specialists from fields such as physical education and sports, physiotherapy and psychology. Recovery programs are oriented towards correcting posture, rebalancing muscles and educating the patient in order to adopt healthy behaviors [21].

Therapeutic interventions should aim to strengthen both the lumbar extensor muscles and relax and stretch the hip flexors, to restore the natural physiological alignment of the spine and prevent long-term complications.

A study highlights the importance of combining physiotherapy and physical therapy in managing low back pain and improving functionality, highlighting the benefits of combined treatments for patients [24].

In addition, psychological support can help increase motivation and adherence to treatment [5], [22].

Thus, the present study aims to analyze the ways in which an interdisciplinary approach can contribute to improving the quality of life in adults with lumbar hypolordosis, highlighting the importance of early intervention and therapeutic strategies adapted to individual needs.

2. Material and Methods

2.1. Date, place and subject of the research

The case study was conducted at the patient's home, between September 1, 2025, and February 28, 2026, with the aim of evaluating the effectiveness of prophylactic and therapeutic interventions on lumbar hypolordosis, as well as quality of life. The investigated subject is a 34-year-old woman, diagnosed with lumbar hypolordosis, without other significant associated conditions, which allowed direct monitoring of functional and postural progress in the context of the individualized recovery program.

The patient's medical history revealed

the onset of low back pain several years ago, without associated major trauma, with negligible medical history, moderate physical activity and a predominantly sedentary posture, factors that may contribute to the appearance and maintenance of lumbar hypolordosis.

2.2. Evaluation methods

a) Postural assessment of the spine

Postural assessment of the patient revealed multiple significant deviations from standard physiological alignment. Pronounced anteriorization of the head and neck was noted, accompanied by prominent shoulders with obvious anterior tilt.

The thoracic and lumbar spine show diminished natural curvatures, highlighting a reduction in lumbar lordosis and normal thoracic kyphosis. In addition, the pelvis is rotated posteriorly, which can generate muscle imbalances and abnormal redistribution of loads on the spine, affecting overall posture and trunk stability.

These postural changes are congruent with the diagnosis of lumbar hypolordosis and emphasize the need to implement individualized therapeutic interventions, aimed at restoring physiological alignment and improving associated symptoms.

b) Postural and muscular functional assessment through inspection and palpation

Muscle and mobility assessment was performed by palpating muscle groups, examining joints, and observing range of motion.

On palpation, the subject presented hypotonia of the spinal extensor muscles and thigh flexors. She also reported pain in the thoracic and lumbar paravertebral muscles, gluteal muscles, and hamstring groups. At the cervical level, the patient complained of muscle contraction and discomfort, indicating tension and functional limitation of the area.

These findings highlight the presence of muscle imbalances associated with lumbar hypolordosis and the need for specific therapeutic interventions to restore normal tone and mobility [23].

c) Assessment of pain intensity by visual analog scale (VAS)

The visual analogue scale (VAS) was used to quantify pain intensity, consisting of a 10 cm horizontal or vertical line placed next to the patient, with values ranging from 0, corresponding to the absence of pain, to 10, representing intense pain. The patient was asked to indicate on the respective scale the perceived level of pain.

This objective evaluation method allows monitoring the evolution of symptoms and the effectiveness of the therapeutic interventions applied [6], [9], [25].

d) Evaluation by Shirado Test

The Shirado test indicates the degree of stability and mobility of the patient's dorso-lumbar spine. Limitations in the amplitude of flexion, extension, rotation or lateral tilt movements, as well as possible asymmetries or compensations, reflect muscle imbalances and diminished postural control [2].

e) Evaluation by Sorensen Test

The Sorensen test is a clinical functional test used to assess the isometric strength of the trunk extensor muscles (especially the lumbar muscles), performed with the subject in the prone position, with the pelvis fixed at the edge of the table and the lower limbs stabilized (by the specialist), while the trunk remains off the support and is maintained in a horizontal position, aligned with the lower limbs and spine, without support, for as long as possible, with the arms either crossed on the chest or at the side of the body, and the duration of maintaining the position is timed to assess the muscular endurance capacity of the lumbar extensors, a shorter time indicating increased fatigue and possible lumbar instability or risk of lumbar pain.

The test is frequently used in the functional assessment of patients with low back pain, muscle imbalances or conditions such as herniated discs or lumbar hyperlordosis, providing useful information in establishing recovery and physiotherapy programs, as well as in monitoring functional progress over time [4], [17].

f) Evaluation by Plank Test

The plank exercise is used to assess global trunk control and stability, being performed by maintaining the body in an aligned position, supported on the forearms and toes, with the head, trunk and lower limbs forming a straight line, without excessive flexion or extension at the lumbar level, while the abdominal, lumbar and shoulder girdle muscles are activated isometrically to prevent collapse or compensations, and the duration of maintaining the position reflects the capacity of muscular endurance, neuromuscular coordination and postural control.

This is a relevant indicator of spinal stability and the risk of lumbar dysfunction, including in contexts such as lumbar hyperlordosis, and is frequently used in functional assessment, physiotherapy programs, and monitoring progress in trunk motor control reeducation [8], [18].

g) Evaluation by Hamstrings Test

It is a clinical test used to assess the flexibility of the hamstring muscles, performed with the subject in supine position, while the examiner passively raises the lower limb with the knee fully extended, keeping the other leg on the support plane, until the sensation of tension or discomfort appears in the posterior thigh. The angle obtained is an indicator of hamstring extensibility, with low values suggesting muscle shortening, which can negatively influence the biomechanics of the pelvis and lumbar spine and can contribute to the appearance of lumbar hyperlordosis-type pain [15].

For a complete functional assessment of the dorso-lumbar spine, the tests must be integrated in a complementary manner, as each provides different but interconnected information about trunk stability and mobility.

The Shirado test measures the isometric resistance of the trunk flexors, providing data on anterior stability and the ability of the abdomen to support the spine, and a low result may indicate anterior imbalance and predisposition to hyperlordosis or lumbar pain; the Sorensen test, by maintaining the trunk in a horizontal position in prone position, evaluates the resistance of the lumbar extensors and posterior stability, and together with the Shirado allows the identification of anterior-posterior imbalance that may be the source of pain or postural changes; plank exercises provide information on global trunk control and neuromuscular coordination, indicating how well posture can be maintained in daily life, and a decrease in the holding time signals control deficiencies that may worsen lumbar instability; flexibility tests, hamstrings identify hidden causes of imbalances, such as shortened muscles that modify the alignment of the pelvis and accentuate the curvatures of the spine.

These assessments give us a holistic picture: the Shirado and Sorensen tests show the balance of anteroposterior muscle forces, the plank assesses global control and stability, and flexibility shows the muscle limits that can affect posture, thus allowing the establishment of a personalized physiotherapy program that corrects imbalances, reduces pain, and prevents the progression of hyperlordosis or other lumbar deformities.

2.3. Research procedure

Within the intervention program intended to correct lumbar hypolordosis, the aim was to generate biomechanical conditions favorable to the reconstruction of the physiological curvatures of the spine, the development of global joint mobility and the optimization of the suppleness of movements, so that they are efficient and functionally coordinated.

Special attention was paid to relaxing the paravertebral muscles and toning the extensor and stabilizing muscles of the spine.

The intervention included exercises performed both on the spot and on the move, individually or with portable objects, using predominantly static exercises in the form of positions derived from basic positions (standing, sitting, kneeling or lying down) and dynamic exercises aimed at correcting postural alignment and improving neuromuscular control.

Intervention program objectives

Alleviating muscle pain by selectively releasing and relaxing the muscle groups involved – aims to reduce discomfort in the paravertebral muscles, trunk flexors and extensors, contributing to increasing functionality and facilitating subsequent corrective exercises.

Optimizing joint mobility and neuromuscular coordination – developing flexibility and motor control of the whole body, through static and dynamic exercises, contributing to correct posture and increasing the functional efficiency of the trunk and limbs.

Increasing thoracic elasticity and maintaining normal respiratory capacity – improving the mobility of thoracic segments and respiratory mechanics to optimize ventilation and prevent functional restrictions associated with postural changes.

Restoring the physiological curvatures of the spine – remodeling lumbar lordosis and thoracic kyphosis through specific postural alignment exercises and toning of the stabilizing muscles, with the aim of reducing biomechanical imbalances and preventing pathological compensations.

3. Results and Discussions

The results obtained after applying the recovery program revealed significant improvements in the patient's condition.

Upon resuming palpation of the muscle groups initially examined, the disappearance of the spinal extensor muscle hypotonia was noted, indicating a restoration of muscle tone and an increase in the trunk's support capacity.

The patient no longer reported pain in the gluteal muscles and hamstrings, a clear sign of reduced muscle tension and improved biomechanical balance. Muscle contraction and cervical pain were also eliminated, reflecting muscle relaxation and reducing joint stress in the neck area.

These changes suggest a favorable correction of posture and an improvement in neuromuscular function. Improved tone and pain reduction contribute to better mobility and an increased quality of life. In the long term, these changes can prevent relapses and support spinal stability. In addition, the results show the effectiveness of the complex program that combined toning, de-stressing and mobility exercises, adapted to the specific needs of the patient.

The success of the treatment emphasizes the importance of an interdisciplinary and personalized approach in the management of lumbar hypolordosis and associated postural problems. These results encourage the continuation of the program and constant monitoring to maintain the benefits obtained, table 1.

Table 1

Values obtained at initial and final assessments when applying the tests

Assessment tests	Initial testing	Final testing	Functional deficit	Functional performance
Shirado Test	1.20min	2 min	decreased resistance, muscle imbalance and increased lumbar pain	normal trunk flexor strength and anterior stability
Sorensen Test	1.10min	2 min	lumbar instability and forward/backward imbalance	lumbar extensor strength and posterior stability
Plank	50sec	1.30min	postural control with increased pain index	global stability with emphasis on trunk control
Hamstrings Test	65°	82°	low value that causes pain	normal flexibility without pain

In the Shirado test, the results highlighted indicate a significant improvement in the subject's ability to maintain the isometric position with raised shoulders. At the final testing, the patient held this position for 2 minutes, compared to 1 minute and 20 seconds at baseline, representing a significant increase from the result at the beginning of the program. This progression reflects the effectiveness of specific exercises to strengthen the neck muscles, as well as those aimed at developing coordination and flexibility of the cervical segment.

Increasing muscle tone and endurance of the neck flexors contributes to postural stability and reduces muscle fatigue in daily activities. These changes have a positive impact on overall functionality and the prevention of cervical discomfort. In addition, the results support the importance of integrating isometric exercises into the therapeutic program to optimize muscle performance and neuromuscular control. Thus, the applied program was effective in improving muscle strength and endurance, contributing to better postural support and alignment. This increase in functional performance highlights the patient's progress and justifies the continuation of treatment with adaptation of the exercises to maintain and amplify the results obtained.

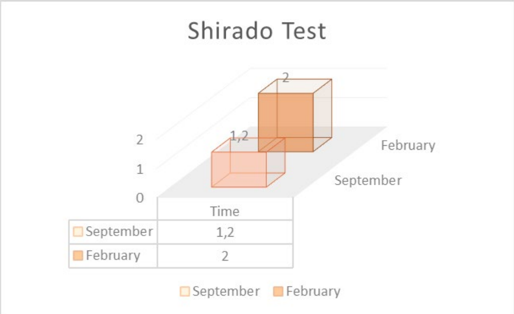

Fig.1. *Values obtained in the initial - final Shirado test*

The results of the Sorensen test, fig.2, indicate a significant increase in isometric resistance of the lumbar extensor muscles, suggesting an improvement in posterior trunk stability; the initial time of 1'10'' reflects a moderate functional deficit, which could contribute to lumbar instability and the maintenance of lumbar pain through early fatigue of the extensors; the improvement to 2 minutes highlights a substantial clinical progress, approaching the values considered normal for the healthy adult population, which indicates the reintegration of neuromuscular control and the increase in the resistance capacity of the lumbar muscles. This evolution can be correlated with physiotherapy programs focused on strengthening the extensors and correcting anteroposterior imbalances; in the functional term, the observed progress reduces the risk of recurrence of low back pain and contributes to maintaining correct posture in daily activities; also, the final result suggests a positive muscular adaptation, improved endurance and a better ability to support static or dynamic loads; compared to the initial value, the progress allows monitoring the effectiveness of therapeutic interventions, providing an objective basis for continuing the rehabilitation program and preventing recurrent low back pain, confirming the relevance of functional assessment and isometric tests in individualized treatment planning.

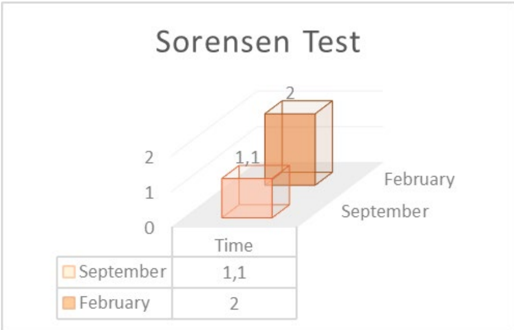

Fig. 2. *Values obtained in the initial-final Sorensen test*

Plank test, fig.3, results indicate a significant increase in global trunk control and neuromuscular stability, reflecting improved ability to maintain correct spinal position under isometric load; initial time of 50 seconds indicated substandard performance, suggesting early fatigue of the abdominal and shoulder girdle muscles, as well as a functional deficit that could contribute to lumbar instability and exacerbation of low back pain.

The progress to 1 minute 30 seconds highlights a clear improvement in muscular endurance and coordination, indicating positive adaptation to the exercise program and an increased capacity to sustain static or dynamic postures without compensations; this evolution suggests a reintegration of trunk motor control, reducing the risk of lumbar extensor overload and favoring the maintenance of correct posture in daily activities; compared to the initial value.

The result provides an objective basis for monitoring functional progress, confirming the effectiveness of therapeutic interventions focused on core stability and preventing low back pain recurrence, demonstrating the relevance of global isometric trunk assessment in the management of low back pain.

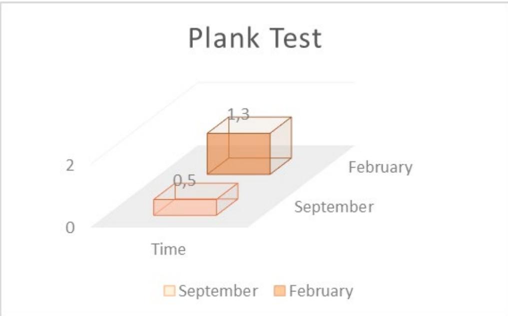

Fig. 3. *Values obtained in the inital – final Plank test*

The results of the Hamstrings test, fig. 4, indicate a significant improvement in hamstring flexibility, highlighted by the increase in the angle from 65° to 82°; the initial value of 65° reflects a moderate functional limitation, suggesting shortening of the hamstrings that may affect the biomechanics of the pelvis and lumbar spine, contributing to lumbar extensor tension and the occurrence of low back pain; progress to 82° indicates a reintegration of normal flexibility, reducing passive tension on the spine and facilitating a more balanced distribution of muscle forces during functional movements and static postures; this evolution suggests the effectiveness of the stretching or muscle reeducation program, as well as the patient's ability to maintain optimal postural control and adequate functional mobility; compared to the initial value, the final result provides an objective indicator of therapeutic progress, confirming the reduction of risk factors for low back pain and the prevention of postural imbalances, as well as the relevance of hamstring flexibility assessment in the global context of trunk stability and mobility.

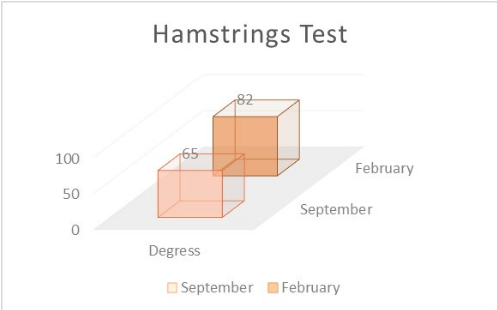

Fig. 4. *Values obtained in the initial-final Hamstrings test*

During the research, the Vas pain scale was also used on the following components, fig.5.

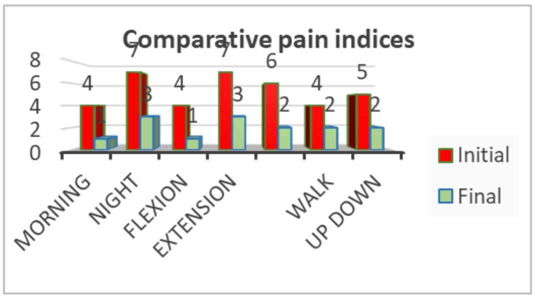

Fig. 5. *Compartive pain indices – scala VAS*

The level of pain felt by the subject was assessed on a numerical scale from 0 to 10, with values reported next to each aspect analyzed. Initially, the subject indicated high levels of pain, which determined the prioritization of exercises to relieve tension and stretch shortened and tense muscles. In parallel, manual therapies were applied to relax the affected areas and facilitate mobility. Subsequently, the assessments revealed a decrease in pain intensity, indicating the effectiveness of the implemented interventions.

The associated graphs show significant improvements in all dimensions analyzed, reinforcing the combined effect of exercises and manual therapies. The recovery program continued with the resumption of monthly de-tensioning exercises, adapted to the level of pain reported by the subject. Manual interventions included local fascia stretches, light pressure in the paravertebral area and decontracting massage of the iliocostal muscles. In parallel, transverse pressures were applied to the contracted areas, while the subject flexed the head and neck. These integrated approaches contributed to a significant decrease in pain and an improvement in overall functionality. Thus, the results suggest that the combination of de-tensioning exercises, toning and manual therapy represents an effective strategy for reducing musculoskeletal pain.

4. Conclusions

At the end of the kinetoterapy program, we noticed remarkable progress in the postural reeducation process. Thus, the patient no longer makes efforts to maintain her balance and no longer gets tired as the day progresses.

One of the most important objectives was to reduce the level of pain, so that the subject could enjoy curricular and extracurricular activities. The decisive factors in this regard were muscle relaxation and toning exercises, swimming sessions, and massage. One of the aspects accused by the subject and analyzed through the lens of pain was a moment during the day, namely, the evening. Thus, the level of pain indicated by the patient decreased following the application of the physiotherapy program from 7 to 3, which represents an improvement of over 50 percent.

The reduction of pain at the thoraco-lumbar level was possible thanks to the application of a personalized kinetic program, depending on the subject's age, gender, preferences and physical and mental capabilities. The interest shown by the patient during the recovery hours and her compliance with the indications provided by the physiotherapist led to positive results and an optimal period of time.

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