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Original Article

Prevalence of Cervical Spine Dysfunction in Patients Seeking Physiotherapy for Chronic Lower Back Pain

Sana Rehman[1], Saniya Alam[2], Syed Hassan Tanvir Ramzi[3], Muhammad Inam[4], Maha Safder[5], Haseeba Aslam[2]

[1] Department of Doctor of Physical Therapy, University of Balochistan, Quetta, Pakistan
[2] Doctor of Physical Therapy, University of Management & Technology, Lahore, Pakistan
[3] Medical Officer, The Cancer Clinic, Multan, Pakistan
[4] Associate Professor of Orthopaedics, MTI–Lady Reading Hospital, Peshawar, Pakistan
[5] Doctor of Physical Therapy, Abasyn University, Islamabad Campus, Pakistan

Corresponding author: Muhammad Inam, dr_mohammadinam@yahoo.co.uk

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ABSTRACT

Background: Chronic low back pain is commonly evaluated using a region-specific approach, although impairments may coexist across different spinal regions. Evidence regarding cervical dysfunction among patients primarily seeking treatment for chronic low back pain remains limited. Objective: To determine the prevalence of cervical spine dysfunction among adults seeking physiotherapy for chronic low back pain and examine its associations with pain intensity and lumbar-related disability. Methods: This cross-sectional study included 72 adults aged 20–60 years recruited consecutively from physiotherapy outpatient departments in the Islamabad–Rawalpindi region. Low back pain intensity was assessed using the Visual Analogue Scale, lumbar disability using the Oswestry Disability Index, and cervical impairment using the Neck Disability Index, cervical range-of-motion assessment, and postural examination. Cervical dysfunction was defined by the presence of at least two cervical impairment criteria. Prevalence, Pearson correlations, Welch t-tests, confidence intervals, and Hedges' g were calculated. Results: Cervical spine dysfunction was identified in 44 participants, producing a prevalence of 61.1% (95% CI: 49.6–71.5%). Neck Disability Index scores correlated with Oswestry Disability Index ($r=0.52$; $p<0.001$) and Visual Analogue Scale scores ($r=0.47$; $p=0.002$). Participants with cervical dysfunction had higher pain scores than those without dysfunction (6.8 ± 1.2 versus 5.5 ± 1.3; mean difference 1.30; 95% CI: 0.69–1.91) and greater lumbar disability (36.9 ± 7.8 versus 26.1 ± 6.5; mean difference 10.80; 95% CI: 7.40–14.20). Conclusion: Cervical spine dysfunction was common and was associated with greater pain and lumbar-related disability. Broader spinal assessment may help identify coexisting impairments, although causal and treatment-related conclusions cannot be drawn. Keywords: Cervical Spine; Chronic Low Back Pain; Musculoskeletal Disorders; Neck Disability Index; Oswestry Disability Index; Physical Therapy; Prevalence

INTRODUCTION

Chronic low back pain is one of the most common and disabling musculoskeletal conditions and contributes substantially to functional limitation, reduced quality of life, work absenteeism, and healthcare use. Although its clinical management commonly focuses on the lumbar region, chronic low back pain may be accompanied by impairments in other regions of the musculoskeletal system. Persistent pain, altered movement behaviour, prolonged protective postures, and changes in neuromuscular control may affect the mechanical and functional relationships between different spinal regions (1–3).

The spine functions as an interconnected biomechanical and neuromuscular system rather than as a collection of isolated anatomical segments. Within this framework, regional interdependence proposes that dysfunction in one body region may coexist with or contribute to symptoms and functional limitations in another. In people with chronic low back pain, altered trunk control, restricted spinal mobility, sedentary behaviour, and compensatory movement patterns may influence thoracic and cervical alignment. These adaptations may manifest as reduced cervical range of motion, altered posture, muscular imbalance, or neck-related disability, even when the cervical region is not the patient's primary reason for seeking physiotherapy (4,5).

Chronic pain may also be associated with altered pain processing and greater sensitivity beyond the principal symptomatic area. This may partly explain why some individuals with persistent low back pain experience pain or disability in anatomically distant regions. Nevertheless, such mechanisms are multifactorial and may also be influenced by occupation, physical activity, ergonomics, psychological factors, sleep, and coexisting musculoskeletal conditions. Cervical abnormalities identified in patients with chronic low back pain should therefore be interpreted as coexisting clinical findings rather than presumed consequences of lumbar dysfunction (6).

Most clinical evaluations of chronic low back pain remain centred on the lumbar region. This region-specific approach may overlook cervical impairments that contribute to the patient's overall disability or influence movement and postural behaviour. Previous research has examined postural abnormalities, cervical pain, scapular mechanics, and lumbar rehabilitation separately, but comparatively little evidence has quantified the coexistence of cervical spine dysfunction among patients who primarily seek physiotherapy for chronic low back pain (7–11). Establishing the frequency of these coexisting findings may help determine whether broader spinal screening is clinically justified.

The present study therefore aimed to determine the prevalence of cervical spine dysfunction among adults seeking physiotherapy for chronic low back pain and to examine its associations with low back pain intensity and lumbar-related functional disability.

MATERIALS AND METHODS

A cross-sectional study was conducted over four months in physiotherapy outpatient departments in the Islamabad–Rawalpindi region. The study population comprised adults seeking physiotherapy for chronic low back pain. The clinical outpatient setting was selected to permit direct evaluation of cervical impairments among patients presenting with persistent lumbar symptoms under routine physiotherapy conditions.

A total of 72 participants were recruited using non-probability consecutive sampling. The target sample was selected according to the feasible number of eligible participants available during the defined recruitment period and was informed by participant numbers used in comparable clinical cross-sectional studies. Based on the observed prevalence in the completed sample, this sample size provided an approximate 95% confidence interval extending 11 percentage points on either side of the prevalence estimate.

Men and women aged 20–60 years were eligible when they presented with low back pain persisting for more than three months, were able to understand and follow assessment instructions, and provided informed consent. Individuals were excluded if they had undergone spinal surgery, experienced recent spinal trauma, had neurological deficits, had a diagnosed inflammatory or systemic musculoskeletal disorder, or had known cervical pathology requiring medical intervention. These criteria were intended to reduce the influence of major structural, neurological, inflammatory, or systemic conditions on the assessment of nonspecific cervical impairment.

Eligible participants underwent a structured clinical assessment. Demographic and clinical information included age, sex, occupation, and duration of low back pain. Occupation was classified according to the

usual physical demands of the participant's work as sedentary, semi-sedentary, or active. Low back pain intensity was measured using the Visual Analogue Scale, with higher scores indicating greater pain intensity. Lumbar-related functional disability was measured using the Oswestry Disability Index, with higher scores indicating greater disability. Cervical disability was assessed using the Neck Disability Index, with higher scores representing greater neck-related functional limitation.

Cervical range of motion was assessed using a universal goniometer. Cervical movements were evaluated against accepted clinical reference ranges to determine whether motion was reduced. Postural assessment was also performed to identify observable cervical-region abnormalities, including forward head posture and rounded shoulders. Assessments were completed by trained physiotherapists using a consistent clinical sequence.

For the purposes of the study, cervical spine dysfunction was operationally defined as the presence of at least two of the following findings: reduced cervical range of motion relative to accepted clinical reference values, an Neck Disability Index score within a disability range, or an observable postural abnormality involving the cervical or shoulder-girdle region. This composite definition was used to distinguish participants with multiple convergent indicators of cervical impairment from those with an isolated clinical finding.

Data completeness and consistency were checked before analysis. All 72 enrolled participants completed the assessment, and no missing observations were identified for the variables included in the analysis. Continuous variables were summarized using means and standard deviations, while categorical variables were reported using frequencies and percentages. Distributional assumptions were evaluated using the Shapiro–Wilk test. The prevalence of cervical spine dysfunction was calculated as the number of participants meeting the operational criteria divided by the total sample, with a Wilson 95% confidence interval.

Pearson correlation coefficients were used to examine the relationships among Neck Disability Index, Oswestry Disability Index, and Visual Analogue Scale scores. Correlation coefficients were presented with 95% confidence intervals. Participants with and without cervical spine dysfunction were compared using independent-samples analysis. Because the group sizes and variances were unequal, inferential estimates were expressed using Welch's t-test. Mean differences, 95% confidence intervals, and Hedges' g standardized effect sizes were derived from the reported group means, standard deviations, and sample sizes. All tests were two-sided, and $p<0.05$ was considered statistically significant.

All participants provided informed consent before data collection. Participant information was handled confidentially and used only for the stated research purposes.

RESULTS

All 72 enrolled participants completed the clinical assessment and were included in the analysis. The mean age was 41.6 ± 10.2 years, and 39 participants (54.2%) were female. Sedentary or semi-sedentary occupations were reported by 44 participants (61.1%), while 28 (38.9%) had physically active occupations. The mean duration of low back pain was 14.3 ± 6.7 months.

Cervical spine dysfunction was identified in 44 of the 72 participants, corresponding to a prevalence of 61.1% (95% CI: 49.6–71.5%). The remaining 28 participants (38.9%) did not meet the composite criteria for cervical spine dysfunction. In the overall sample, the mean Visual Analogue Scale score was 6.3 ± 1.4, the mean Oswestry Disability Index score was 32.7 ± 8.9, and the mean Neck Disability Index score was 15.1 ± 7.3. Participants classified as having cervical spine dysfunction had a mean Neck Disability Index score of 18.5 ± 6.2.

Neck-related disability was positively associated with both lumbar-related disability and low back pain intensity. The correlation between Neck Disability Index and Oswestry Disability Index scores was

moderate and statistically significant (r=0.52; 95% CI: 0.33–0.67; p<0.001). Neck Disability Index scores were also moderately correlated with Visual Analogue Scale scores (r=0.47; 95% CI: 0.27–0.63; p=0.002). The association between Oswestry Disability Index and Visual Analogue Scale scores was slightly stronger (r=0.58; 95% CI: 0.40–0.72; p<0.001). Participants with cervical spine dysfunction had a mean Visual Analogue Scale score of 6.8 ± 1.2 compared with 5.5 ± 1.3 among those without dysfunction. The mean between-group difference was 1.30 points (95% CI: 0.69–1.91; Welch t=4.26; df=54.2; p<0.001), corresponding to a large standardized difference (Hedges' g=1.04).

Table 1. Demographic and Clinical Characteristics of Participants

Characteristic	Category	n (%) or Mean ± SD
Age, years	—	41.6 ± 10.2
Sex	Male	33 (45.8)
	Female	39 (54.2)
Occupation	Sedentary	28 (38.9)
	Semi-sedentary	16 (22.2)
	Active	28 (38.9)
Duration of low back pain, months	—	14.3 ± 6.7

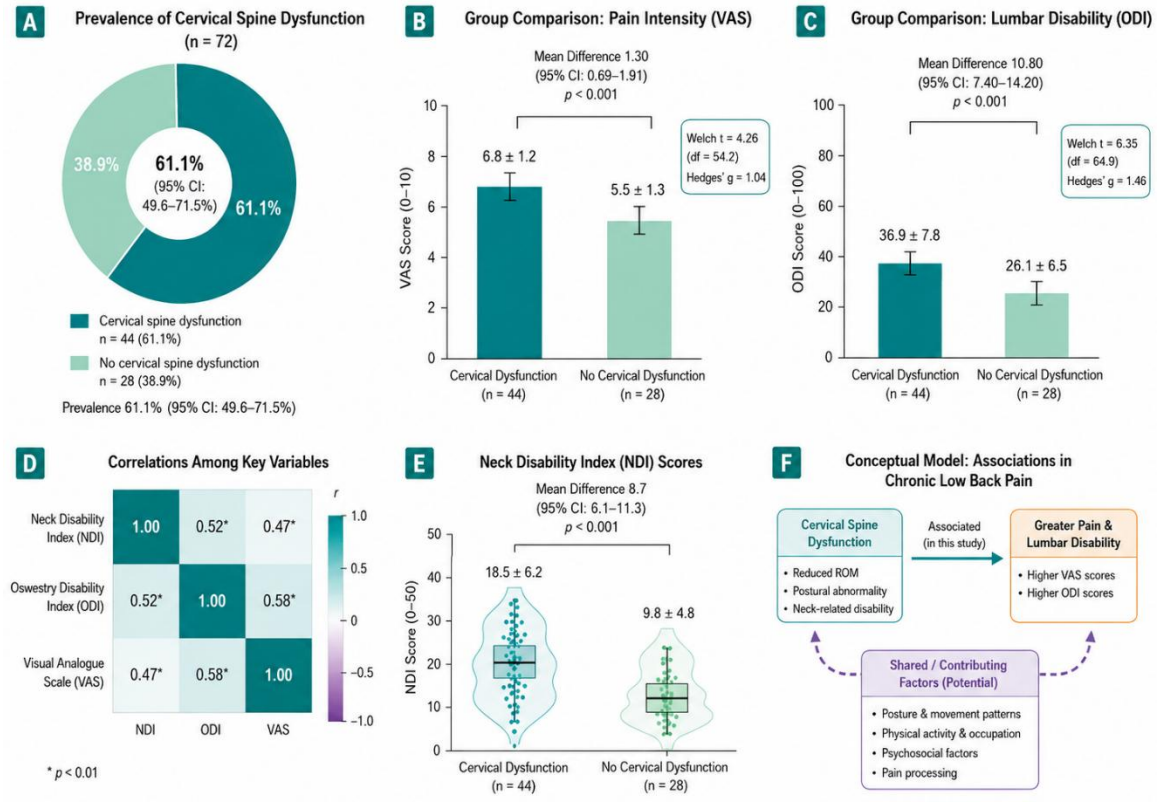

Figure 1 The multipanel figure summarizes a 61.1% prevalence of cervical spine dysfunction and shows that affected participants had higher pain intensity and lumbar disability, with significant moderate correlations among NDI, ODI, and VAS scores; the conceptual panel highlights these as associations potentially influenced by shared postural, occupational, psychosocial, and pain-processing factors rather than causal relationships.

Table 2. Clinical Outcome Measures and Prevalence of Cervical Spine Dysfunction

Outcome	Mean ± SD or n (%)	95% CI
Visual Analogue Scale score	6.3 ± 1.4	—
Oswestry Disability Index score	32.7 ± 8.9	—
Neck Disability Index score, overall sample	15.1 ± 7.3	—
Neck Disability Index score, cervical dysfunction group	18.5 ± 6.2	—
Cervical spine dysfunction	44 (61.1)	49.6–71.5
No cervical spine dysfunction	28 (38.9)	28.5–50.4

CI: confidence interval; SD: standard deviation. Prevalence confidence intervals were calculated using the Wilson method.

Table 3. Correlations Among Cervical Disability, Lumbar Disability, and Pain Intensity

Variables	r	95% CI	p-value
Neck Disability Index and Oswestry Disability Index	0.52	0.33–0.67	<0.001
Neck Disability Index and Visual Analogue Scale	0.47	0.27–0.63	0.002
Oswestry Disability Index and Visual Analogue Scale	0.58	0.40–0.72	<0.001

CI: confidence interval; r: Pearson correlation coefficient. Confidence intervals were derived using Fisher's z transformation.

Table 4. Comparison of Pain and Lumbar Disability According to Cervical Spine Dysfunction

Outcome	Cervical Dysfunction (n=44), Mean ± SD	No Cervical Dysfunction (n=28), Mean ± SD	Mean Difference (95% CI)	Welch t (df)	p-value	Hedges' g
Visual Analogue Scale score	6.8 ± 1.2	5.5 ± 1.3	1.30 (0.69–1.91)	4.26 (54.2)	<0.001	1.04
Oswestry Disability Index score	36.9 ± 7.8	26.1 ± 6.5	10.80 (7.40–14.20)	6.35 (64.9)	<0.001	1.46

Lumbar-related disability was also greater among participants with cervical spine dysfunction. The mean Oswestry Disability Index score was 36.9 ± 7.8 in the dysfunction group and 26.1 ± 6.5 in the group without dysfunction. The mean difference was 10.80 points (95% CI: 7.40–14.20; Welch t=6.35; df=64.9; p<0.001), with a large standardized effect size (Hedges' g=1.46). These findings demonstrate that cervical spine dysfunction, as operationally defined in this study, was common among patients seeking physiotherapy for chronic low back pain and was associated with greater pain intensity and lumbar-related disability.

DISCUSSION

This study found that cervical spine dysfunction was present in approximately three-fifths of adults seeking physiotherapy for chronic low back pain. Participants who met the study criteria for cervical dysfunction reported greater low back pain intensity and greater lumbar-related disability than participants who did not meet those criteria. Neck-related disability was also moderately correlated with both lumbar disability and pain intensity. These findings indicate that cervical impairments and lumbar symptoms frequently coexist within this clinical population.

The observed prevalence supports the broader concept that persistent musculoskeletal complaints may involve more than the region identified as the patient's primary source of symptoms. The spine operates through coordinated mechanical and neuromuscular interactions, and prolonged changes in posture, movement, and muscle recruitment may affect multiple spinal regions. Previous evidence has described associations among sedentary behaviour, postural abnormalities, cervical symptoms, scapular mechanics, and altered spinal function (3–5). Nevertheless, the present cross-sectional findings do not establish that lumbar dysfunction caused the cervical findings or that cervical dysfunction preceded the development of low back pain.

The moderate positive correlation between Neck Disability Index and Oswestry Disability Index scores suggests that participants reporting greater neck-related limitation also tended to report greater lumbar-related limitation. This relationship may partly reflect shared physical restrictions, reduced activity, pain-related behaviour, occupational exposure, or broader musculoskeletal symptom burden. It may also reflect common characteristics of self-reported disability instruments, because both indices evaluate the influence of pain on daily activities. Consequently, the correlation should not be interpreted as evidence that impairment in one spinal region directly produces disability in the other.

Neck-related disability was also associated with greater low back pain intensity. Several mechanisms could plausibly contribute to this pattern. Persistent pain may be accompanied by protective movement, increased muscular co-contraction, reduced movement variability, and changes in pain processing. However, these mechanisms were not directly measured in this study. Central sensitization, psychological distress, sleep disturbance, fear of movement, and widespread pain were also not evaluated and therefore cannot be confirmed as explanations for the observed associations.

The between-group comparisons were clinically notable. Participants with cervical spine dysfunction reported a mean Visual Analogue Scale score 1.30 points higher than those without dysfunction, with a large standardized difference. The corresponding difference in Oswestry Disability Index score was 10.80 points and was also associated with a large standardized effect. These findings suggest that the coexistence of cervical impairment identifies a subgroup with a comparatively greater overall symptom and disability burden. Nevertheless, the estimates were unadjusted, and differences in age, sex, occupation, symptom duration, physical activity, ergonomics, medication use, or other musculoskeletal conditions may have contributed to the group differences.

The findings have implications primarily for clinical assessment. Physiotherapists evaluating chronic low back pain may benefit from asking about neck symptoms and examining cervical mobility and posture when clinically indicated. Such screening may help identify coexisting limitations that would otherwise remain unrecognized. The present study did not evaluate treatment, however, and cannot establish that adding cervical interventions to low back pain management improves clinical outcomes. That question requires a prospective interventional study.

A strength of the study was its evaluation of a clinically relevant outpatient population using measures of pain, lumbar disability, cervical disability, cervical movement, and posture. All enrolled participants completed the assessments, and the main numerical findings were internally consistent. The presentation of prevalence confidence intervals, correlation confidence intervals, between-group mean differences, and standardized effect sizes also permits clearer interpretation of the precision and magnitude of the findings.

Several limitations require consideration. First, the cross-sectional design prevents determination of temporal sequence or causality. Second, consecutive recruitment from outpatient departments in one geographical region may limit generalizability to other clinical and community populations. Third, the sample was selected non-randomly, and the sample-size target was based primarily on feasibility rather than a prospectively reported prevalence calculation.

Fourth, cervical spine dysfunction was defined using a study-specific composite of disability, reduced range of motion, and observable postural abnormality. Although requiring more than one finding reduced reliance on an isolated abnormality, the composite definition has not been established as a diagnostic reference standard. The Neck Disability Index was also included within the classification and subsequently examined as a continuous analytical variable, which may have strengthened some observed relationships through incorporation of a classification component.

Fifth, cervical range-of-motion thresholds, postural classification procedures, and inter-rater reliability were not reported in sufficient detail to establish full reproducibility. Sixth, the analyses were unadjusted and did not account for potential confounders. Psychosocial characteristics, sleep, physical activity, body mass index, occupational ergonomics, medication use, and comorbid pain were not measured. Finally, both the Neck Disability Index and Oswestry Disability Index are self-reported measures and may share variance related to general pain burden and activity limitation.

Future studies should use prospectively defined and validated criteria for cervical dysfunction, standardized cervical range-of-motion and postural measurements, larger multicentre samples, and adjusted statistical models. Longitudinal studies are needed to determine whether cervical impairments precede, follow, or develop independently of chronic low back pain. Randomized studies may subsequently determine whether treatment directed at clinically verified cervical impairments provides additional benefit beyond conventional management of chronic low back pain.

CONCLUSION

Cervical spine dysfunction, as operationally defined in this study, was present in 61.1% of adults seeking physiotherapy for chronic low back pain and was associated with greater low back pain intensity and

lumbar-related disability. These findings support consideration of cervical symptoms and impairments during the broader clinical assessment of chronic low back pain. Because the study was cross-sectional and used an unvalidated composite classification, the results should be interpreted as evidence of coexistence and association rather than causation or treatment effectiveness.

REFERENCES

1. Treleaven J. Management of sensorimotor control in musculoskeletal disorders. 2024;374.
2. Tikhile P, Patil DS. Unveiling the efficacy of physiotherapy strategies in alleviating low back pain: a comprehensive review of interventions and outcomes. 2024;16(3):e56013.
3. Mikkonen J. Postural stability and its relationships with chronic low back pain, central sensitization, and pain-related sleep quality. 2023.
4. Benamati A. Postural monitoring and neuromuscular synergies related to damage due to a sedentary lifestyle. 2025.
5. Javdaneh N, Barati A, Shojaedin S, Mirzaei RM. Is chronic neck pain related to scapular dyskinesia? A systematic review. BMC Musculoskelet Disord. 2025;26(1):585.
6. Bozgeyik-Bağdatli S, Yavuz DC, Özçelik BA, Çetin H. Segment-specific alterations in trapezius muscle viscoelasticity in chronic neck pain: a myotonometric case-control study. Int J Osteopath Med. 2026:100815.
7. Ameri B, Fatahi A, Abadi RN, Molavian R. Dynamic neuromuscular stabilization exercise and chronic lumbar disc herniation: effects on pain, mobility, and trunk endurance—a randomized controlled trial. 2025;8(12):e71611.
8. Amjad F, Hamza M, Khalid M, Irum A, Faisal S. Evaluating the effects of scapular stabilization and thoracic extension exercises on pain, functional disability, cervical mobility, and postural alignment in young adults with text neck syndrome. J Health Wellness Community Res. 2025:e201-e.
9. Chan MK, Tulina D. Golf players' injuries: bioregenerative sport medicine and holistic perspectives. European Wellness Academy; 2026.
10. Fonseca Fialho HR, Fonseca RNS, Scattone Silva R, Ribeiro AP, Nascimento PHC, Kamonseki DH, et al. Association between kinetic-chain factors and the presence of shoulder pain in the non-athletic population. 2025:17585732251328338.
11. Short S, Short G, Lehman G, Friesen J, Johnson B. A critical review of trunk and hip exercise prescription: applying evidence for a modern approach. Int J Sports Phys Ther. 2025;20(3):448.
12. Popli S, Lamba VK, Kumar R. Interventions for forward head posture and neck disability among administrative populations: a systematic review. 2026;9(1):1-9.
13. Chen ML, Yu-Qing D, Xu BY, Zhao F, Hu XQ, Wang Y, et al. New insights into the pain of knee osteoarthritis: characteristics of deep pain and abnormal central processing. 2026;78(1):47-56.
14. Carnegie DR. Investigating the effects of restricting lumbar spine flexion on spine and lower-extremity mechanics during lifting [dissertation]. Toronto: University of Toronto; 2024.
15. Herrington L, Spencer S. Principles of exercise rehabilitation. In: Petty N, editor. Principles of Musculoskeletal Treatment and Management. 2023. p. 233.
16. Rajopadhye K. Clinical examination of the foot and ankle. In: Foot and Ankle Biomechanics. Elsevier; 2023. p. 433-49.

17. Lewis J, Lowton-Smith S, North R. Management of shoulder injuries. In: Routledge Handbook of Sports and Exercise Therapy. Routledge; 2024. p. 875-930.

18. Lee R. Posture and movement kinematics for individuals with idiopathic chronic neck pain using computers [dissertation]. Newcastle: University of Newcastle; 2024.

19. Vandenberg NW. The biomechanical influence of transfemoral bone-anchored limb use and predictive modelling applications for enhancing clinical efficacy [dissertation]. Denver: University of Colorado Denver; 2025.

20. da Costa Moreira ES, Lemos T, Baptista AF, Heiderick Y. Balance, gait speed, and functional strength in individuals with spinocerebellar ataxia and healthy controls: a cross-sectional study on disease severity. 2025;61(2):25-50.