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Research Article

Epidemiological trends and clinical spectrum of spine disorders in a rural tertiary care physiotherapy clinic – a cross-sectional study

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ABSTRACT

Spine disorders are a leading cause of disability, especially in rural populations due to occupational and ergonomic factors. This study aimed to evaluate the epidemiological trends and clinical spectrum of spine disorders in a rural tertiary care physiotherapy setting in Maharashtra. A retrospective cross-sectional study was conducted on 932 physiotherapy OPD patients. Data were stratified by gender and categorized into degenerative, posture-related, and other disorders. Descriptive statistics were used. Females constituted 51.72% of cases. Degenerative disorders predominated (67.27%), followed by posture-related (28.33%) and others (4.40%). Cervical radiculopathy (33.01%), lumbar radiculopathy (23.76%), and prolapsed intervertebral disc (22.17%) were most common. Mechanical low back pain (34.09%) and neck pain (21.59%) led to posture-related conditions. A high burden of degenerative and posture-related disorders highlights the need for early physiotherapy, targeted rehabilitation, and ergonomic interventions.

Keywords: Epidemiology, Physiotherapy, Spine disorders,

INTRODUCTION

Spine disorders are among the most prevalent musculoskeletal conditions, causing significant pain, disability, and socioeconomic burden worldwide. They impair mobility, functional independence, and quality of life across all age groups. According to the Global Burden of Disease (GBD) 2021 report, low back pain (LBP) remains the leading cause of years lived with disability (YLDs), while neck pain ranks among the top contributors to musculoskeletal morbidity [1,2]. The World Health Organization (WHO) estimates that over 1.71 billion people live with musculoskeletal conditions, with LBP contributing nearly 7–8% of YLDs globally [3]. The lifetime prevalence of LBP is 60–80%, and nearly one-third experience neck pain at least once [4,5]. These figures highlight the need for multidisciplinary, community-based rehabilitation, especially in rural and resource-limited populations such as India.

The etiology of spinal disorders is multifactorial, including degenerative, postural, occupational, and lifestyle-related causes. Degenerative conditions such as lumbar spondylosis, disc herniation, and facet joint arthropathy increase with age, while posture-related disorders are common in younger sedentary

individuals [5]. Chronic mechanical stress, poor posture, weak core musculature, and inadequate ergonomics contribute significantly [6].

In India, the burden is higher in rural and tribal populations (65–70%), largely due to physically demanding occupations such as farming and manual labour involving repetitive bending, lifting, and prolonged stooping, imposing excessive biomechanical loads on the spine [7,8]. Studies from Maharashtra report high prevalence rates: LBP (4.9–10%), neck pain (2.9–3.6%) in Raigad, and 12-month prevalence of back pain (76%) and neck pain (44%) in Gadchiroli [7,8]. Musculoskeletal pain is also common among rural homemakers [9].

Nutritional deficiencies (vitamin D, calcium), poor conditioning, socioeconomic constraints, and limited access to physiotherapy contribute to chronicity. Healthcare-seeking is often delayed due to cultural beliefs, financial barriers, and reliance on traditional remedies before seeking professional care [10].

Spinal disorders are classified into degenerative, posture-related/mechanical, and other specific conditions based on etiology and clinical presentation. Degenerative disorders include spondylosis, lumbar canal stenosis, prolapsed intervertebral disc

(PIVD), radiculopathy, and spondylolisthesis [11–13]. Posture-related conditions such as mechanical neck pain, upper back pain, trapezititis, upper cross syndrome, and sacroiliac (SI) joint dysfunction arise from faulty posture and muscle imbalance [14–17]. Other conditions include post-laminectomy syndromes and spinal fractures. Untreated conditions may progress to chronic pain and psychosocial distress, emphasizing early physiotherapy intervention focusing on core stabilization, posture correction, and ergonomic modification.

Despite the burden, epidemiological data from rural India remain limited, as most studies focus on urban populations [7,8,13]. Dedicated spine clinics in tertiary care settings provide multidisciplinary management integrating physiotherapy, ergonomic counselling, and preventive care. Multidisciplinary rehabilitation has been shown to improve pain, disability, and return-to-work outcomes, while early physiotherapy reduces healthcare utilisation, accelerates recovery, and enhances functional outcomes, particularly in resource-limited settings [18].

Hence, this study was undertaken to analyse the epidemiological trends of spine disorders in patients attending a tertiary care physiotherapy spine clinic in rural Maharashtra.

MATERIAL AND METHODS

Study design and setting

This retrospective cross-sectional study was conducted at the Spine Clinic of the Physiotherapy Outpatient Department of a rural tertiary care hospital in Maharashtra, India. The clinic receives both direct patient visits and referrals from orthopaedic services and other healthcare facilities.

Study population and eligibility criteria

Data were obtained from the physiotherapy spine clinic registry. Patients aged ≥ 18 years presenting with cervical, thoracic, or lumbar spine disorders were included. Patients with non-spinal conditions, serious spinal pathologies (e.g., malignancy, infection), acute trauma, non-spine-related neurological disorders, or incomplete clinical records were excluded.

Data collection and classification

A total of 932 patients attending the clinic between October 2024 and October 2025 were included. Demographic and clinical data were extracted from registry records. Cases were categorized into three groups: degenerative disorders, posture-related disorders, and other specific conditions based on clinical diagnosis documented in records.

Statistical analysis

Data were analysed using descriptive statistics. Frequency and percentage distributions were calculated to summarize demographic and clinical characteristics.

Ethical considerations

The study was conducted in accordance with institutional ethical standards. Ethical approval was obtained from the Institutional Ethics Committee (approval number: [IEC/2025/773/A]). As this was a retrospective record-based study, the requirement for informed consent was waived.

RESULTS

Figure 1: Gender-wise distribution of conditions

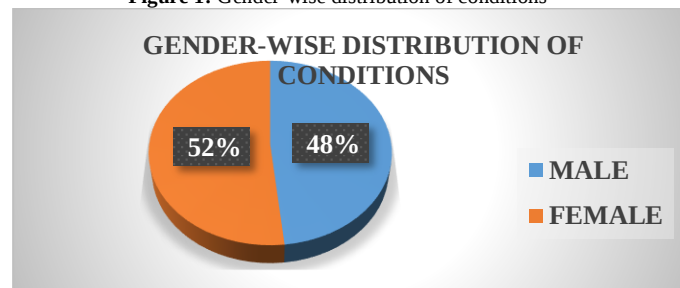


Table 1: Gender-wise distribution of conditions

Gender	Number Of Patients (N)	Percent (%)
Male	450	48.28
Female	482	51.72
Total	932	

The gender-wise distribution of the study population ($n = 932$) is given in (Table 1) and illustrated as a pie chart in (Figure 1). Among the total participants, females constituted a slightly higher proportion (51.72%) compared to males (48.28%).

Figure 2: Distribution of spine conditions

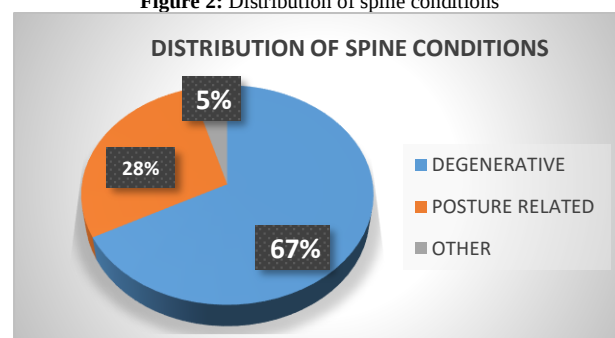
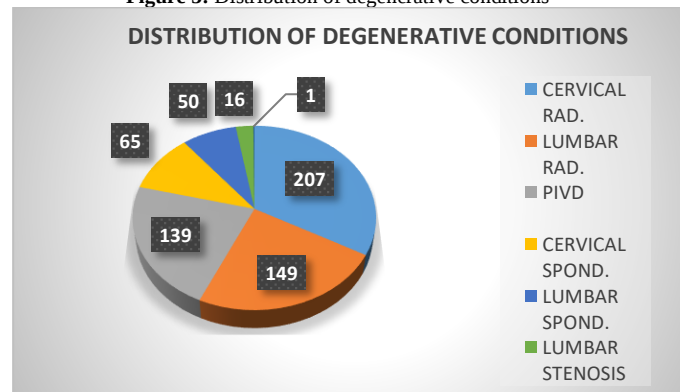


Table 2: Distribution of spine conditions

Conditions	Number Of Cases (N)	Percent (%)
Degenerative	627	67.27
Posture Related	264	28.33
Other	41	4.40
Total	932	

The distribution of spine conditions among the study population ($n = 932$) is depicted in Table 2 and is illustrated as a pie chart in Figure 2. Degenerative disorders formed the largest category, accounting for 67.27% of all cases, followed by posture-related conditions (28.33%), while other specific conditions like post-laminectomy and spine fracture (4.40%) constituted a smaller proportion.

Figure 3: Distribution of degenerative conditions



The pattern of degenerative spine disorders among 627 patients is given in (Table 3) and is illustrated as a pie chart in (Figure 3). The most frequently observed condition was cervical radiculopathy (33.01%), followed by lumbar radiculopathy (23.76%) and prolapsed intervertebral disc (22.17%). Cervical

spondylosis (10.37%) and lumbar spondylosis (7.97%) were comparatively less common, while lumbar stenosis (2.55%) and lumbar listhesis (0.16%) accounted for a small fraction of cases.

Table 3: Distribution of degenerative conditions

Degenerative Conditions	Number Of Cases (N)	Percent (%)
Cervical Rad.	207	33.01
Lumbar Rad.	149	23.76
PIVD	139	22.17
Cervical Spond.	65	10.37
Lumbar Spond.	50	7.97
Lumbar Stenosis	16	2.55
Lumbar Listhesis	1	0.16
Total	627	

Figure 4: Distribution of posture-related conditions

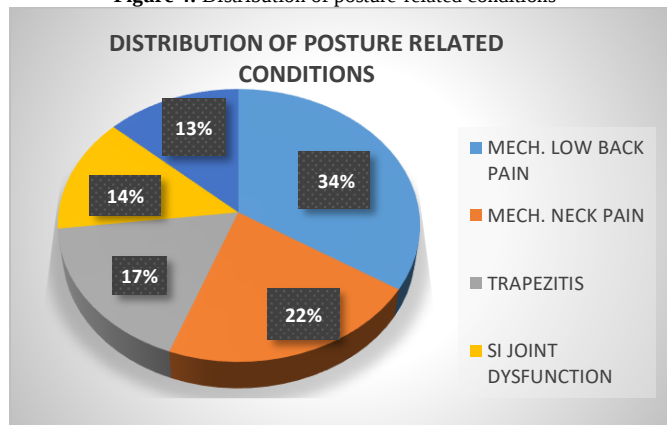


Table 4: Distribution of posture related conditions

Posture Related Conditions	Number Of Cases (N)	Percent (%)
Mech. Low Back Pain	90	34.09
Mech. Neck Pain	57	21.59
Trapezititis	46	17.42
SI Joint Dysfunction	36	13.64
Upper Cross Syndrome	35	13.26
Total	264	

The pattern of posture-related spine conditions among 264 patients is depicted in (Table 4) and is illustrated as a pie chart in (Figure 4). The most prevalent condition was mechanical low back pain (34.09%), followed by mechanical neck pain (21.59%) and trapezititis (17.42%). Sacroiliac joint dysfunction (13.64%) and upper cross syndrome (13.26%) were also commonly observed.

Figure 5: Distribution of other specific conditions

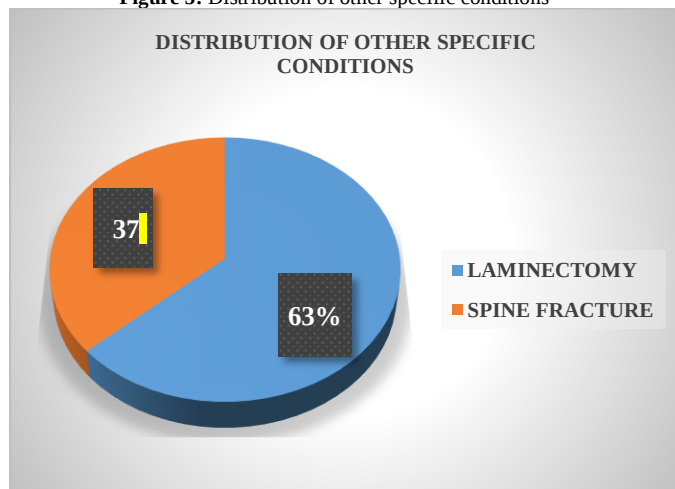


Table 5: Distribution of other specific conditions

Other Specific Conditions	Number Of Cases (N)	Percent (%)
Laminectomy	26	63.41
Spine Fracture	15	36.59
Total	41	

The distribution of other specific spine conditions among 41 patients is depicted in (Table 5) and is illustrated as a pie chart in (Figure 5). Post-laminectomy cases (63.41%) constituted the majority, while spine fractures (36.59%) formed the remaining proportion. This data indicates that a considerable number of patients attending the physiotherapy spine clinic required postoperative or post-traumatic rehabilitation, emphasizing the essential role of continued physiotherapy care in functional recovery and long-term spine health maintenance.

DISCUSSION

This study provides important insights into the epidemiological and clinical spectrum of spine disorders in a rural tertiary care physiotherapy setting, highlighting a substantial and multifactorial burden across both sexes, with slight female predominance (51.72%). This aligns with Indian community-based studies reporting higher musculoskeletal morbidity among women due to cumulative workload, dual responsibilities, and limited ergonomic awareness [7-9]. The near-equal gender distribution underscores that spine disorders are a pervasive public health concern rather than being confined to a specific demographic group.

The predominance of degenerative disorders (67.27%) reflects a significant shift toward advanced spinal pathology in rural populations, with cervical radiculopathy (33.01%), lumbar radiculopathy (23.76%), and prolapsed intervertebral disc (22.17%) being the most common conditions. These findings suggest a high burden of nerve root compression syndromes, indicating delayed presentation and progression from non-specific pain to structurally advanced conditions. Such patterns contrast with earlier reports emphasizing non-specific low back pain and highlight the evolving clinical spectrum in rural settings. The high prevalence of disc pathology further supports the need for early screening and timely physiotherapy interventions to prevent chronicity and neurological compromise.

Posture-related disorders (28.33%), including mechanical low back pain and neck pain, reflect the combined influence of traditional occupational strain and emerging sedentary behaviours. These findings reinforce the dual burden of biomechanical stressors in rural populations. While structurally less severe, these conditions significantly impact functional capacity and productivity but remain highly amenable to physiotherapy interventions focused on postural correction, stabilisation, and ergonomic modification.

The presence of postoperative and traumatic conditions (4.40%), particularly post-laminectomy cases and spinal fractures, highlights the expanding role of tertiary care physiotherapy services in managing complex rehabilitation needs. These cases necessitate structured, multidisciplinary rehabilitation pathways, which may be challenging in rural contexts due to limited follow-up and accessibility.

From a systems perspective, the study demonstrates the value of a dedicated physiotherapy spine clinic in enabling early

identification, clinical stratification, and evidence-based management of diverse spinal disorders. Such models facilitate continuity of care, reduce disability, and improve functional outcomes, particularly when tailored to rural occupational and socioeconomic contexts. Collectively, these findings demonstrate a multifactorial burden of spine disorders in rural populations, with predominance of degenerative radiculopathy, significant posture-related dysfunction, and notable rehabilitation needs, underscoring the critical role of structured physiotherapy spine services in rural healthcare systems.

The study provides a strong service-planning framework for strengthening physiotherapy spine clinics in rural tertiary hospitals. The distribution of degenerative, posture-related, and other conditions supports targeted resource allocation and highlights the substantial demand for rehabilitation services. Importantly, the findings indicate that rural populations experience both traditional and modern spinal health challenges, often with delayed presentation and increased severity.

Establishing accessible, regionally based spine clinics can reduce barriers to care, minimise treatment delays, and improve cost-effectiveness. This approach aligns with the World Health Organization (WHO), which calls for multidisciplinary musculoskeletal care hubs delivering person-centred, timely, and equitable management of chronic conditions ^[19]. Additionally, the Ministry of Health & Family Welfare (MoHFW), Government of India, through its National Musculoskeletal Health initiatives, emphasises the integration of services at district and sub-district levels ^[16]. The present findings support these policy directions and advocate for scaling up structured spine-care services in rural healthcare systems.

The retrospective design and hospital-based sampling limit the generalisability of findings to the broader rural population, particularly individuals with mild or unreported symptoms. Selection bias toward more severe or referred cases may have influenced the observed predominance of degenerative conditions. Future research should incorporate prospective, community-based designs to better capture population-level trends and risk factors, including occupational exposure, nutrition, and ergonomics. The inclusion of imaging and functional outcome measures would further enhance diagnostic accuracy and allow differentiation between degenerative and posture-related disorders.

CONCLUSION

This study highlights the predominance of degenerative radiculopathy alongside a substantial burden of posture-related and postoperative spine disorders in a rural tertiary care setting. The findings emphasise the critical role of evidence-based physiotherapy in early intervention, functional restoration, and prevention of long-term disability. Strengthening dedicated spine clinic services within rural tertiary hospitals is essential for improving patient outcomes

and supporting sustainable, context-specific healthcare delivery in rural India.

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Conflict of interest

There was no conflict of interest for this study.

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