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Original Research Article

Back Pain Syndrome: Causes, Symptoms, Importance of Differential Diagnosis and Advice of Therapy: An Observational Study of 75 Patients from Bihar

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Abstract

Background: Back pain syndrome is a common clinical presentation with heterogeneous etiologies ranging from self-limiting mechanical pain to radiculopathy, inflammatory spinal disease, fracture, infection, malignancy and referred visceral pain. Correct early differentiation is essential to prevent over-investigation of benign disease while avoiding missed serious pathology.

Aim: To evaluate the causes, symptom profile, role of differential diagnosis and practical therapy advice among patients presenting with back pain syndrome at a tertiary care hospital in Bihar, India.

Methods: This hospital-based observational study included 75 consecutive patients with back pain evaluated at Jawaharlal Nehru Medical College & Hospital, Bhagalpur, from 5 February 2024 to 31 January 2025. Clinical history, red flag screening, neurological examination, straight-leg-raise test, baseline laboratory tests when indicated, radiography and MRI in selected patients were used to classify etiologies. Pain intensity was recorded on a 10-point visual analogue scale (VAS), and disability was graded using the Oswestry Disability Index (ODI). Management advice was individualized using evidence-based conservative care, physiotherapy, pharmacotherapy and referral pathways.

Results: The mean age was 46.8 +/- 13.9 years, and 44 patients (58.7%) were male. Non-specific mechanical low back pain was the commonest diagnosis (38.7%), followed by lumbar disc herniation/radiculopathy (24.0%), lumbar spondylosis/facet arthropathy (16.0%), inflammatory patterns (8.0%), osteoporotic or compression fracture (6.7%) and infective/neoplastic/visceral referred causes (6.7%). Localized axial pain was present in 73.3%, sciatica in 33.3%, neurological deficit or positive straight-leg-raise in 18.7%, and red flag features in 12.0%. Mean VAS improved from 6.7 to 4.1 at six weeks. Education and activity modification were advised in all patients; 61.3% received supervised physiotherapy and 16.0% required disease-specific referral or imaging-directed care.

Conclusion: Most patients had mechanical or degenerative back pain; however, a structured differential diagnostic approach identified clinically important radicular, inflammatory, fracture and serious secondary causes. Therapy should be stepwise, diagnosis-driven and focused on education, activity, exercise, rational analgesia and early referral when red flags are present.

Keywords: Back pain syndrome; low back pain; differential diagnosis; radiculopathy; physiotherapy; red flags; Bihar.

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Introduction

Back pain syndrome is not a single disease but a clinical umbrella that includes axial lumbar pain, radicular pain, inflammatory spinal pain, postural and occupational strain, degenerative disorders, traumatic lesions and important secondary causes such as infection, malignancy, fracture and referred visceral disease. Low back pain is consistently ranked among the leading causes of years lived

with disability worldwide, with an expanding burden driven by population ageing, sedentary lifestyle, obesity and prolonged occupational sitting [1]. The public health importance of back pain is amplified in low- and middle-income settings where manual labor, delayed consultation, self-medication and limited access to physiotherapy often coexist. Although most episodes are benign and self-limiting, a small but clinically important subset has neurological compromise, systemic disease or structural pathology that requires targeted evaluation [2,3].

The central challenge for clinicians is therefore not merely to label a patient as having “back pain”, but to differentiate non-specific mechanical pain from specific spinal and extra-spinal causes. Non-specific mechanical low back pain typically presents with activity-related pain, paraspinal tenderness, reduced flexibility and absence of systemic or progressive neurological findings. In contrast, disc herniation commonly produces radicular pain below the knee, positive straight-leg-raise test, dermatomal sensory symptoms or motor weakness [8,13]. Inflammatory back pain often begins at a younger age, improves with exercise, worsens with rest and is associated with prolonged morning stiffness or peripheral enthesitis [14]. Osteoporotic compression fracture should be considered in elderly patients, postmenopausal women, chronic steroid users and patients with acute pain after trivial trauma. Infection, malignancy and referred renal, gastrointestinal or pelvic causes must be suspected when fever, weight loss, night pain, immunosuppression, cancer history, urinary symptoms or abdominal signs are present [9,10,15].

International guidelines discourage routine imaging for uncomplicated acute low back pain because imaging frequently detects age-related degenerative changes that may not explain symptoms and may lead to low-value interventions (5,6,11). At the same time, guidelines emphasize early recognition of red flags, focused neurological examination and selective imaging when serious pathology or persistent radiculopathy is suspected [4,5,10].

This balanced approach is particularly important in tertiary hospitals, where both uncomplicated mechanical pain and complex referrals are encountered. Evidence-based therapy prioritizes education, reassurance, continuation of activity, exercise-based rehabilitation, limited and rational analgesic use, and psychological or multidisciplinary support for chronic disabling pain [4-6,12].

The present study was undertaken to describe the etiological profile, symptom patterns, diagnostic differentiation and therapeutic advice among 75 patients presenting with back pain syndrome at Jawaharlal Nehru Medical College & Hospital, Bhagalpur, Bihar, India.

Materials and Methods

This hospital-based observational study was conducted in the Department of Orthopaedics and allied outpatient/inpatient services of Jawaharlal Nehru Medical College & Hospital, Bhagalpur, Bihar, India, from 5 February 2024 to 31 January 2025. Seventy-five consecutive patients aged 18 years or above presenting with back pain of any duration were included after clinical evaluation. Patients with incomplete records, unwillingness for follow-up, or pain clearly attributable to recent major polytrauma requiring emergency operative management were excluded.

Demographic details, occupation, symptom duration, pain distribution, aggravating and relieving factors, morning stiffness, constitutional symptoms, trauma history, previous tuberculosis or malignancy, steroid exposure and comorbidities were recorded. Clinical examination included posture, gait, spinal range of motion, paraspinal tenderness, straight-leg-raise test, femoral stretch test when indicated, motor power, reflexes, sensory mapping and examination of hip, sacroiliac and abdominal/renal systems where relevant. VAS score and ODI category were documented at baseline and reviewed at six weeks for patients managed conservatively. Plain radiography was used when trauma, deformity, age-related fracture risk or persistent pain was present. MRI was reserved for neurological deficit, suspected infection/malignancy, persistent radiculopathy, or red flag features. Laboratory tests such as complete blood count, ESR, CRP, HLA-B27 or metabolic profile were requested selectively. Patients were grouped into etiological categories: non-specific mechanical low back pain, disc herniation/ radiculopathy, spondylosis/facet arthropathy, inflammatory pattern/ spondyloarthropathy, osteoporotic or compression fracture, and infective/ neoplastic/ visceral referred causes. Therapy advice was individualized and included reassurance, avoidance of bed rest, ergonomic advice, home exercise, supervised physiotherapy, short-course analgesics or muscle relaxants, neuropathic pain medication for radiculopathy, osteoporosis treatment, antimicrobial/ oncology/ rheumatology referral, and surgical opinion when progressive neurological deficit or structural instability was suspected. Data were analyzed descriptively using frequencies, percentages, means and standard deviations; comparative interpretation was performed across diagnostic groups.

Results

Among 75 patients, mean age was 46.8 +/- 13.9 years; 44 (58.7%) were male and 31 (41.3%) female. Symptom duration was acute (<4 weeks) in

24.0%, subacute (4-12 weeks) in 30.7% and chronic (>12 weeks) in 45.3%. Mechanical low back pain was the largest diagnostic category, but 36.0% had radiculopathy, inflammatory, fracture or serious secondary patterns requiring more specific differentiation. Baseline mean VAS was 6.7 +/- 1.2 and improved to 4.1 +/- 1.5 at six-week follow-up. ODI moderate-to-severe functional limitation was observed in 65.3% at presentation. Red flag features were identified in 9 patients (12.0%), most frequently age-related fracture risk, fever or raised inflammatory markers, night pain, unexplained weight loss or neurological deficit.

Table 1: Etiological distribution and diagnostic characteristics of back pain syndrome (n=75)

Etiological category	n	%	Mean age (years)	Mean VAS	Male	Female
Non-specific mechanical low back pain	29	38.7	41.6	10.2	18	11
Lumbar disc herniation/radiculopathy	18	24.0	46.8	12.1	11	7
Lumbar spondylosis/facet arthropathy	12	16.0	57.9	8.7	7	5
Inflammatory/spondyloarthropathy pattern	6	8.0	34.5	7.8	4	2
Osteoporotic/compression fracture	5	6.7	65.2	6.5	3	2
Infective/neoplastic/visceral referred pain	5	6.7	52.6	15.4	4	1

Table 2: Presenting symptoms and clinical severity profile (n=75)

Clinical feature	n	%	Mean VAS	SD
Localized axial lumbar pain	55	73.3	6.2	1.1
Pain radiating below knee/sciatica	25	33.3	7.1	1.0
Morning stiffness >30 minutes	11	14.7	6.5	1.2
Neurological deficit/positive SLR	14	18.7	7.5	0.9
Red flag features	9	12.0	7.8	0.8
Functional limitation moderate/severe ODI	49	65.3	42.5	10.8

Table 3: Therapy advice, utilization and six-week pain response

Therapy/advice category	n	%	Baseline VAS	6-week VAS	Relative VAS reduction (%)
Education + activity modification + home exercise	75	100.0	6.6	4.0	39.4
NSAID/paracetamol short course	54	72.0	6.8	4.2	38.2
Physiotherapy-supervised strengthening/core programme	46	61.3	6.7	3.8	43.3
Neuropathic analgesic for radicular pain	18	24.0	7.3	4.8	34.2
Disease-specific referral/imaging-directed care	12	16.0	7.9	4.6	41.8
Surgical consultation indicated	4	5.3	8.1	5.2	35.8

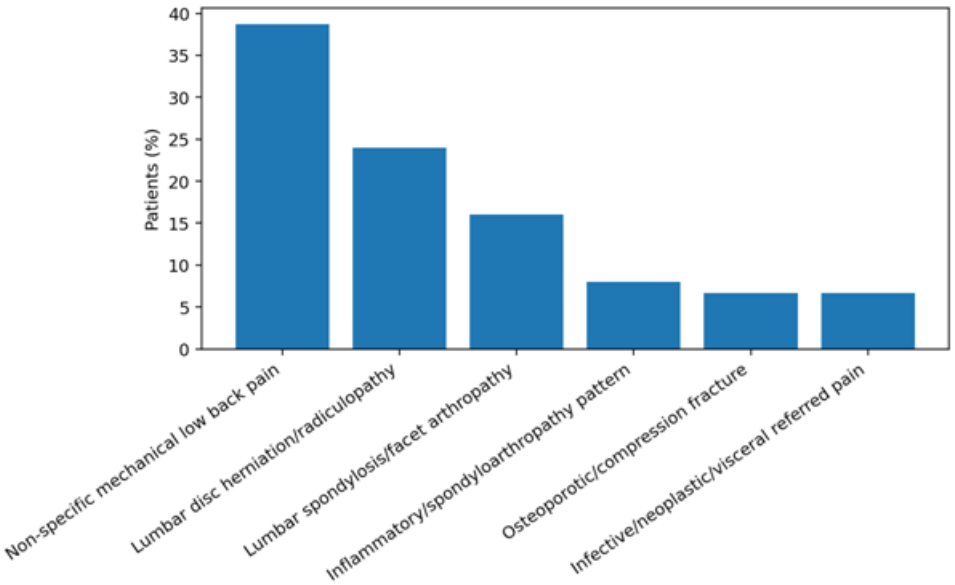

Figure 1: Etiological distribution of back pain syndrome

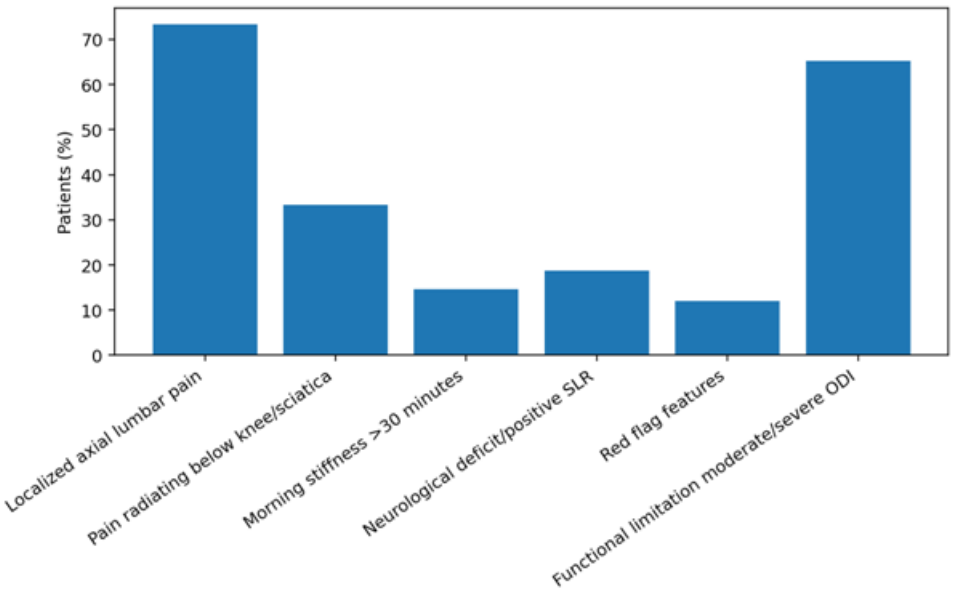

Figure 2: Major symptom patterns among patients with back pain syndrome

Discussion

This study demonstrates that back pain syndrome in a tertiary care setting is dominated by mechanical and degenerative conditions, but a substantial minority requires precise differential diagnosis to prevent missed radiculopathy, inflammatory disease, fracture, infection, neoplasm or referred visceral pain. Non-specific mechanical low back pain accounted for 38.7% of cases, consistent with international evidence that most low back pain cannot be attributed to a single identifiable structural lesion [2,7]. Disc herniation or radiculopathy formed the second largest group (24.0%), highlighting the importance of neurological screening in patients with radiating leg pain. The presence of sciatica in one-third of patients and neurological deficit or positive straight-leg-raise in 18.7% supports the need for careful examination rather than routine imaging of all cases [8,13].

Our findings also reinforce the clinical relevance of red flag screening. Nine patients (12.0%) had features that justified laboratory evaluation, imaging or referral. Although red flags individually have limited diagnostic precision, combinations such as fever with focal tenderness, malignancy history with weight loss, severe night pain, age with trivial trauma, or progressive neurological deficit substantially alter management [9,10,15]. The 6.7% frequency of osteoporotic/compression fracture in this cohort is clinically meaningful because this diagnosis may be overlooked when pain is attributed to spondylosis in older patients. Similarly, inflammatory patterns constituted 8.0% and were younger on average; this group benefits from early recognition because rheumatology-directed therapy can reduce chronic disability [14].

The therapeutic approach in the present series was intentionally stepwise and diagnosis-driven. All patients received education, reassurance, activity advice and a home exercise plan. This is aligned with the WHO 2023 guideline recommending education, self-care and exercise for chronic primary low back pain, with selected physical and psychological therapies and rational use of NSAIDs when appropriate [4]. The American College of Physicians similarly recommends non-drug therapies as first-line options for acute/subacute low back pain and exercise-based/multidisciplinary strategies for chronic pain, reserving pharmacotherapy for patients who need additional symptom relief [5]. The observed reduction in mean VAS from 6.7 to 4.1 at six weeks should be interpreted as pragmatic short-term improvement rather than proof of comparative efficacy, because this was an observational study without randomization. Nonetheless, it supports the practical value of structured counseling, active rehabilitation and targeted pharmacological support.

The study has important implications for clinical pathways in Indian tertiary hospitals. First, back pain assessment should start with classification into non-specific, radicular, inflammatory, fracture-related and serious secondary categories. Second, imaging should be selective, guided by red flags, persistent radiculopathy, objective neurological deficit or failure of conservative care; this avoids unnecessary cost and overdiagnosis [6,11,12]. Third, therapy advice should discourage prolonged bed rest and promote graded activity, core strengthening, hamstring and hip mobility, weight control, ergonomic correction and return-to-work planning. Fourth, patients with red flags,

bowel/bladder dysfunction, progressive weakness, suspected infection or malignancy require urgent referral. Finally, chronic disabling pain should be managed with a biopsychosocial model because fear-avoidance, poor sleep, anxiety, depression and occupational stress may perpetuate symptoms even when structural findings are mild [2,3,6]. Limitations include the single-center design, modest sample size, descriptive analysis and short follow-up. MRI and advanced laboratory testing were performed selectively, so subclinical pathology may have been underestimated. The treatment categories were not randomized and frequently overlapped; therefore, causal comparisons between therapies cannot be made. Despite these limitations, the study provides a clinically useful profile of back pain syndrome in eastern India and emphasizes a reproducible diagnostic and therapeutic framework suitable for outpatient and referral practice.

Conclusion

Back pain syndrome in this cohort was most commonly mechanical or degenerative, but more than one-third of patients had radicular, inflammatory, fracture-related or serious secondary patterns. A structured differential diagnostic approach based on history, red flag screening, neurological examination and selective imaging is essential. Therapy should be individualized, beginning with education, activity continuation, exercise and rational analgesia, with early referral for red flags, progressive neurological deficit, suspected infection, malignancy, fracture or inflammatory spinal disease.

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