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Original Research Article

RADIOGRAPHIC STUDY OF PREVALENCE OF SPONDYLOLISTHESIS AND TRANSITIONAL LUMBOSACRAL SEGMENT IN CHRONIC LOW BACK PAIN SUBJECTS

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Abstract: The purpose of this study is to measure the prevalence of, spondylolisthesis, transitional lumbosacral segmentation, in patients 21 to 65 years of age with chronic low back pain (CLBP).This retrospective study analyzed 100 digital lumbar radiographic series obtained during a case control study of patients with CLBP. Chronic low back pain is defined as pain in the low back lasting 12 weeks or longer. Radiographic findings of spondylolisthesis, and lumbosacral transitional segmentation were graded by 2 authors using established classification criteria. Lumbosacral transitional segments graded I to IV (Castellvi classification) were present in 14% of cases.
Isthmic spondylolisthesis was present in 5% of cases, with L5 the most common location. Degenerative spondylolisthesis demonstrated a prevalence of 34%, most commonly occurring at L4. The prevalence of degenerative spondylolisthesis was 60 % for women aged 50 to 59 years and 40% for men in the same age range.

Key words: Low Back Pain, Prevalence, Spondylolisthesis, Radiography, Lumbosacral transitional segment.

Introduction: Low back pain resulting from degenerative diseases of the lumbosacral spine is a major cause of morbidity, disability and lost productivity. Guidelines recommend against radiography for uncomplicated acute and subacute low back pain in part to reduce cost, to decrease risk from ionizing radiation exposure, and to avoid labeling patients with a condition that may not be the cause of pain.(1, 3-5). However, for patients with uncomplicated chronic low back pain (CLBP), definitive radiographic recommendations are less certain. (1, 5). One reason why radiography is often used for low back pain evaluation may be because some findings provide information considered important to manual therapy providers as they alter the management strategy (2,6-8). Narrowing of intervertebral disc spaces escalates the risk of stenosis and/or radicularcompression, (11) zygapophyseal degeneration (11 - 13) leads to motion segment

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laxity(11,14 -16) and is thought to contribute to facetogenic pain(16). Although lumbosacral transitional segments are not strongly associated with low back pain, high-velocity low amplitude manipulative forces (19, 20) could still affect accessory joints.

Likewise, spondylolisthesis (isthmic or degenerative) can be a clinically important finding, although the condition may not be a source of pain. Degenerative spondylolisthesis can contribute to lumbar stenosis, whereas the isthmic type does not (11,21,22).

Material and Methods

Radiographic data for this secondary analysis came from a case control study which included 100 low back pain patients attending Orthopedic OPD conducted at GMC Nagpur and referred to department of Radiology for X ray.

Participants were excluded from the study with the following criteria -

1. If they reported neurological symptoms and demonstrated corresponding neurological signs (myotome weakness and absent lowerextremity reflex[s]).
2. Bone or joint abnormality
3. History of spinal surgery,
4. Vascular claudication

Radiographs were obtained when the history demonstrated unresponsiveness to prior care. Digital lumbar anterior to posterior (A-P) and lateral radiographs were obtained on 100 participants with CLBP who received baseline clinical evaluation. Radiographs were studied by DICOM viewer software with expert opinion of senior radiologist. The radiographs of the cases were taken in lying down position with an anode film distance of 110 cm. centered on L_3 vertebra.

Spondylolisthesis:

Isthmic spondylolisthesis was identified by forward translation of a vertebral body accompanied by an osseous defect or disruption in the parsinterarticularis.Degenerative spondylolisthesis was identified by anterior vertebral body positioning with intact pars interarticularis.Both forms were graded by type and amount of anterior translation using the Meyerding grading system(24)Grade 1 represents anterior translation of up to 25% of the posterior to anterior distance of the inferior vertebral body or sacrum as measured on the lateral image (grade 2, 26%-50%; grade 3, 51%-74%; grade IV, 75%-100%)(24).

Lumbosacral Transitional Segmentation.

Lumbosacral transitional egments were graded using a classification system developed by Castellvi.(25). This system graded the presence of unilateral or bilateral enlarged transverse processes,accessory joints, or fusion in the lumbosacral area. Figure 3 shows examples of lumbosacral transitional segments graded with the Castellvi classification system.

Results

Isthmic spondylolisthesis was present in 5 cases representinga prevalence of 5%. L5 was the most common location ,(9) followed by L4 (2) and L3.(1).Meyerding grade 2 was present in 2 cases at L5 and 1 case at L4, whereas grade 3 was present in a single case at L3. Degenerative spondylolisthesis was present in 34 cases, representing a prevalence of 34%. The most common location for degenerative spondylolisthesis was L4(18) followedby L5(13) and L3 (2). Degenerative spondylolisthesis occurred once(1%) in the group with age less than 40. Within other age group comparisons revealed 9 cases (28%) of degenerative spondylolisthesis in the 40- 49 year age group, 22 cases (51%) within 50- 59 year age group, and 2 cases (28%) with age group more than 60 years. Degenerative spondylolisthesis by sex and age group is presented in Table 1.

Fourteen lumbosacral transitional segments were identified using the Castellvi classification system indicating a prevalence of 14%. There were 1 (7%) exhibiting accessory joints or fusion (Castellvi type II-IV).

Discussion

Spondylolisthesis

Degenerative spondylolisthesis results from a combination of zygapophyseal (facet joint) deterioration and disc narrowing.(11). Our results are consistent with others reporting this finding more commonly in women 18 (36%) than men16 (32%), most prevalent at L4(18) and with increasing age(21,26).Reduced prevalence in the age group more than 60 years is because of the very small sample in that age group. Our results showed that degenerative spondylolisthesis changed from 21% in women aged 40 to 49 years to 60% in women aged 50 to 59 years, whereas men aged 40 to 49 years demonstrated 33% prevalence increasing to 40% in the 50-to-59 group. Given the increasing prevalence trend in men aged 50 to 59 compared with earlier age groups, the results from this study are consistent with a 31% prevalence reported by Denard et al (26) in men aged more than 64.Isthmic spondylolisthesis exhibits an anatomic defect located in the pars interarticularis, and most commonly occurs at L5(23).The prevalence of isthmic spondylolisthesis was 5%, approximately half the 8% reported elsewhere in a community sample(27).

Lumbosacral Transitional Segments

Lumbosacral transitional segments are congenital anomalies of the lowest spinal segment, demonstrating anomalous formation of L5 or the superior sacral segment(28).Although the relationship between lumbosacral transitional segments and low back pain is neither fully understood nor widely agreed upon (10,28 -31),recent evidence shows an association with types II and IV, characterized by accessory joints (32).In this study, 8 (8%) were classified withaccessory joints or fusion (types II-IV).

Conclusion

This retrospective study provides prevalence data for radiographic findings of lumbosacral transitional segments, spondylolisthesis. Degenerative spondylolisthesis was more common over 40 years old in women and men. Knowledge of the high frequency of this condition in certain patient groups may assist clinicians with diagnostic and clinical management strategies.

Table 1: Degenerative spondylolisthesis by gender and age in chronic low back pain subjects (N = 100)

Age	Women		Men		Total	
	Sample size	No.(%)	Sample size	No.(%)	Sample size	No.(%)
<40	10	0 (0%)	8	1(12%)	18	1(5.5%)
40 - 49	14	3 (21%)	18	6 (33%)	32	9(28%)
50 -59	23	14 (60%)	20	8 (40%)	43	22(51%)
60 -65	3	1 (33%)	4	1(25%)	7	2(28%)
Total	50	18 (36%)	50	16 (32%)	100	34 (34%)

Figure 1: Spondylolisthesis (grade I degenerative)

Figure 2: Spondylolisthesis (grade II degenerative)

Figure 3: Lumbosacral transitional segment

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