



SPONDYLOLYSIS AND SPONDYLOLISTHESIS IN YOUNG POPULATION: A PREVALENCE AND MIDTERM FOLLOW UP STUDY

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ABSTRACT **Background:** Low back ache in young population is very common in the present world especially in those with exertional athletic activities. Lumbar Spondylolysis and Spondylolisthesis are often identified on radiographs of these patients. Early diagnosis is beneficial in formulating a treatment plan and also prevent complications like radiculopathy. **Aim:** To determine the prevalence of Spondylolysis and Spondylolisthesis in young symptomatic low back ache population. **Materials And Method:** A cross sectional study was done on all patients between the age group of 15 – 40 years who presented to the Orthopaedics Outpatient Department with low back ache. Collection of demographic details and clinical assessment were done before subjecting them to radiographs of the Lumbar spine. If needed additional flexion and extension lateral views were taken. ODI score was assessed in radiological positive patients. These patients were started on a structured physical therapy and pain medications. Patients were followed up at regular intervals and then finally at the end of 24 months, the ODI scores were compared with that of the initial score. **Results:** 138 patients were positive for Lumbar Spondylolysis (43.48%) and Spondylolisthesis (56.52%) and were included in the study group. Among which, 22 lost follow up and 18 developed radiculopathy during the course of the study. At the end of the study, 53 males and 45 females were assessed. A statistically significant reduction in the disability from high grade to low grade at the end of 24 months in the study group was noted which confirmed that early diagnosis and a structured physical therapy played a major role in prevention of complications. **Conclusion:** An early diagnosis and a complete clinic-radiological examination is advised in all young population presenting with low back ache.

KEYWORDS : exertional athletic activities; radiographs; radiculopathy; ODI scores; conservative therapy

INTRODUCTION:

Low back ache in young adults and middle aged people is becoming a common problem in the present world with more of sedentary lifestyle. Spondylolysis and Spondylolisthesis are often identified on Clinical evaluation of patients with low back ache. Spondylolysis refers to a defect in the pars interarticularis and Spondylolisthesis is the anterior translation of the vertebral body³. Spondylolysis is most commonly observed in lower lumbar vertebrae¹. Individuals engaged in various athletic activities are more likely to develop symptomatic low backache associated with spondylolysis²⁻⁴. Previous studies suggest that Lumbar Spondylolysis has a prevalence of 60% in adult population and that of Lumbar Spondylolisthesis is not age related⁶. Several aetiologies which results in repeated hyperextension and torsional force on the lower vertebrae are said to be the cause of these Spinal Abnormalities. This is way more common in Males and athletes who train for more than 15 hours in a day. Common levels of slippage occurs at L4-L5 and L5-S1 based on the type of Spondylolisthesis. Isthmic Spondylolisthesis is frequently associated with Spondylolysis. Other causes of Low backache includes Disc herniation, Apophyseal ring fracture, Spondylodiscitis, Osteomyelitis and neoplasms of the vertebrae. Hence an appropriate clinical evaluation and cost efficient diagnostic tests like radiographs will help in differentiating Lumbar Spondylolysis and Spondylolisthesis from the other causes of Low backache⁷. Early diagnosis is needed to prevent the progression of the slippage in Spondylolisthesis and the development of radiculopathy. False negative cases with clinical suspicion can be subjected for the other diagnostic modalities which includes Computed Tomography and Magnetic Resonance Imaging of the lumbar vertebrae. Initial conservative therapy with Analgesics, IFT/SWT lower back, Spinal core muscle strengthening exercises and Antilordotic back braces (LS bracing) with frequent follow up is mandatory to avoid progression of the disease^{2,14}.

Materials And Methods:

Study design- Cross sectional study

Initially all patients with low back ache between the age group of 15-40 consulting an Orthopaedic Outpatient department in a Tertiary Care Hospital between January to July 2019 were assessed. Demographic details like Age, Sex and Occupation were obtained. Clinical evaluation was done. These patients were then subjected to radiographs and were divided into 2 groups.

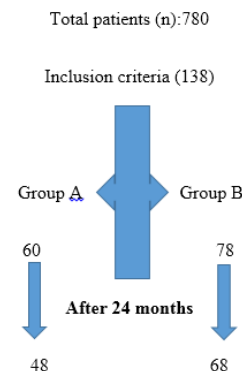
Inclusion criteria:

All low back ache patients between the age group of 15 – 40 years with radiologically confirmed spondylolysis and spondylolisthesis.

Exclusion criteria:

- Patients with other causes of low back ache like neoplasms and infections of the spine
- Pregnant patients
- Traumatic low back ache
- Congenital deformities
- Patients with radiculopathy/neurological deficit at the initial presentation

Group A consisted of patients with Lumbar Spondylolysis and Group B consisted of patients with Lumbar Spondylolisthesis.



Xray of the Lumbosacral spine in Anteroposterior and Lateral views were taken before assigning the patients in separate groups. If needed, additional Flexion and Extension lateral views were taken. The patients with positive radiological findings of pars defect (Spondylolysis) [Figure 1] or an obvious slip (Spondylolisthesis) [Figure 2 & 3] were included in the study. The time from initial complaint to the present diagnosis was noted in the study group. This was done to determine the delay in starting the treatment. Functional outcome was assessed using the ODI (Oswestry Disability Index)

score at the time of diagnosis. Treatment plan was started in the study group and were later asked to follow up in the OPD every six months. Clinicoradiological assessment was done at each follow up. Finally at the end of 24 months, ODI scores were once again calculated and compared with the initial scores at the time of diagnosis.



Figure 1: Lateral view of Spondylolysis at L5/S1



Figure 2: Lateral view of Spondylolisthesis at L4/L5

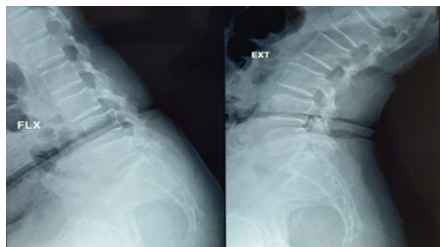


Figure 3: Flexion and Extension lateral views of Spondylolisthesis at L3-L4.

RESULTS:

780 patients with Low back ache were assessed between 15-40 years [Table 1]. Among which 138 were positive. 60 were in Group A (Chart 1). Out of which, 48 were studied at the end of 24 months and 12 lost follow up. Among these 48 patients, 46 had on and off Low back ache with temporary relief on Physiotherapy and Analgesics. The rest 2 developed radiculopathy during the course of the study. 78 were included in Group B (Chart 1). Out of which, 68 were studied and 10 lost follow up. In these 68 patients with Spondylolisthesis, 16 developed radiculopathy or claudication during the course of the study and were advised further investigation and surgical management. Remaining 52 had no radiculopathy and were continued with conservative treatment.

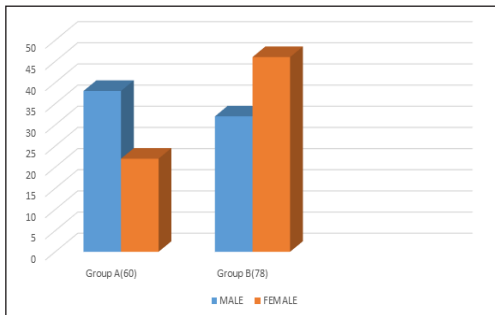
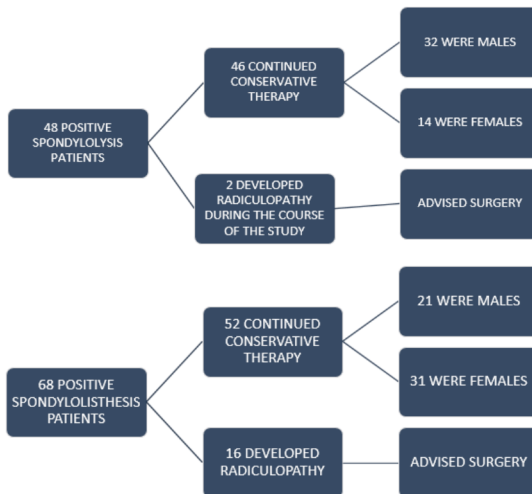


Chart 1: Demographic comparison of positive cases at the time of diagnosis:

Table 1: Demographic statistics of the study

VARIABLES	FREQUENCIES
Total number of symptomatic low backache patients	780 (n)
Total number of female patients assessed	442
Total number of male patients assessed	338
Spondylolysis	60
Spondylolisthesis	78
Total number of positive patients included in the study	138
Total patients at 24 months follow up	98



Thus at the end of 24 months, 98 patients were studied as they turned out well with no radiculopathy/neurological deficit. Out of the 46 Group A patients, 32 (32.65%) were males and 14 (14.28%) were females.

Out of the 52 Group B patients 31 (31.63%) were females and 21 (21.43%) were males.

The pars defect of the lumbar spine was commonly seen at L5 level (61.67%) [Table 2] and the slippage was more at L4 – L5 level (48.72%) when compared to the other levels [Table 3].

Average time of delay from the onset of first symptom to the diagnosis was nearly one year. During this initial period, patient would have ignored taking help from a health care professional considering it as a simple lumbar strain or would have avoided screening test which could have diagnosed the condition earlier.

At the time of diagnosis, 28.57% were having Minimal disability, 44.90% were having Moderate disability, 19.39% were having severe disability and 7.14% were crippled [Table 4]. After conservative therapy at the end of 24 months, the disability reduced from higher grades to lower grades which confirmed that early diagnosis and structured physical therapy has played a major role in preventing the development of further complications in these patients.

Table 2: Comparison of the pars defect seen in the lumbar vertebrae

Spine levels	Percentage of the positive lesions (mean %)
L3	13.3
L4	25
L5	61.67

Table 3: Comparison Of The Common Levels Of Slippage Of The Lumbar Vertebrae

Spine levels	Percentage of positive lesions (Mean %)
L2 – L3	2.56
L3 – L4	20.51
L4 – L5	48.72
L5 – S1	28.21

Table 4: Comparison of ODI scores at the time of diagnosis and at the end of 24 months

DISABILITY GRADING	AT THE TIME OF DIAGNOSIS	AT THE END OF 24 MONTHS

MILD	28.57%	48.98%
MODERATE	44.90%	41.84%
SEVERE	19.39%	9.18%
CRIPPLED	7.14%	0%
BED BOUND	0%	0%

DISCUSSION

The major finding of this study is the prevalence of Spondylolysis (7.69%) and Spondylolisthesis (10%) in Young Population. Spondylolysis was common at L5 level and Spondylolisthesis was commonly seen at L4-L5 level. This was in accordance with the previous study done by Leonid Kalichman et al. Age and Gender based prevalence of Spondylolysis and Spondylolisthesis in this study were matching with previous studies done by Jacobsen S et al., Libson E et al. and Rosenberg NJ. During this midterm follow up, we found the development of radiculopathy was less in Spondylolysis as compared to Spondylolisthesis, which gives a brief idea of the natural course of the disease. Physical therapy in form of Interferential therapy and Shock wave therapy along with core muscle strengthening exercises were effective in improving the pain as in the study done by Olawale O A et al.

CONCLUSION:

The findings in this study suggests a relatively higher prevalence of Spondylolysis and Spondylolisthesis in young symptomatic population with low back pain. Without proper investigations, this often is treated as exertional lumbar strain. Often there has been a delay in starting the treatment as most of these patients are treated symptomatically during their first presentation. We propose that a basic clinical evaluation and radiographic screening at the first visit to a health care provider can help in diagnosing and preventing the progression of Spondylolysis and Spondylolisthesis. This in turn avoids the development of radiculopathy or claudication and neurological deficit at a much younger age. Hence earlier the time of diagnosis, better is the prognosis of these Spinal Abnormalities.

Limitation:

Much longer follow up will give a better picture about the natural course of the disease

REFERENCES:

1. Kalichman L, Kim DH, Li L, Guermazi A, Berkin V, Hunter DJ. Spondylolysis and spondylolisthesis: prevalence and association with low back pain in the adult community-based population. *Spine (Phila Pa 1976)*. 2009;34(2):199-205. doi:10.1097/BRS.0b013e31818edcfd
2. Blanda J, Bethem D, Moats W, Lew M. Defects of pars interarticularis in athletes: a protocol for nonoperative treatment. *J Spinal Disord*. 1993;6(5):406-411. doi:10.1097/00002517-199306050-00007
3. Micheli LJ, Wood R. Back pain in young athletes. Significant differences from adults in causes and patterns. *Arch Pediatr Adolesc Med*. 1995;149(1):15-18. doi:10.1001/archpedi.1995.02170130017004
4. Garry JP, McShane J. Lumbar spondylolysis in adolescent athletes. *J Fam Pract*. 1998;47(2):145-149.
5. Fredrickson BE, Baker D, McHolick WJ, et al. The natural history of spondylolysis and spondylolisthesis. *J Bone Joint Surg Am*. 1984;66:699-707
6. Virta L, Rönnemaa T, Osterman K, et al. Prevalence of isthemic lumbar spondylolisthesis in middle - aged subjects from eastern and western Finland. *J Clin Epidemiol*. 1992;45:917-922
7. Shah SA, Saller J. Evaluation and diagnosis of back pain in children and adolescent. *J Am Acad Orthop Surg* 2016;24:37e45
8. Tonosu J, Takeshita K, Hara N, et al. The normative score and the cut-off value of the Oswestry Disability Index (ODI). *Eur Spine J*. 2012;21(8):1596-1602. doi:10.1007/s00586-012-2173-7
9. Vianin M. Psychometric properties and clinical usefulness of the Oswestry Disability Index. *J Chiropr Med*. 2008;7(4):161-163. doi:10.1016/j.jcm.2008.07.001
10. Wittse LL, Widell EH, Jr, Jackson DW. Fatigue fracture: the basic lesion in isthemic spondylolisthesis. *J Bone Joint Surg Am*. 1975; 57 :17-22
11. Jacobsen S, Sonne - Holm S, Røvsing H, et al. Degenerative lumbar spondylolisthesis : an epidemiological perspective ; the Copenhagen Osteoarthritis Study. *Spine*. 2007;32:120-125
12. Libson E, Bloom RA, Dinari G. Symptomatic and asymptomatic spondylolysis and spondylolisthesis in young adults. *Int Orthop*. 1982; 6 :259-261.
13. Rosenberg NJ. Degenerative spondylolisthesis. Predisposing factors. *J Bone Joint Surg Am*. 1975; 57:467-474.
14. Iwamoto J, Takeda T, Wakano K. Returning athletes with severe low back pain and spondylolysis to original sporting activities with conservative treatment. *Scand J Med Sci Sports*. 2004;14(6):346-357.
15. Olawale O A, Agudzeamegah C M. The efficacy of interferential therapy and exercise therapy in the treatment of low back pain. *Niger J Exp Clin Biosci* 2014; 2:10-4.