ORIGINAL ARTICLE

Frequency of Spondylolisthesis among Patients of Chronic Low Back Pain in Karachi

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ABSTRACT

Objective: To assess the frequency of Spondylolisthesis among patients of Chronic Low Back Pain in Karachi
Method: This cross sectional study was conducted from April 2012 to December 2012. Patients were selected from four Hospitals consisting of two private and two government tertiary care hospitals. A total of 313 patients confirmed through MRI as suffering from low back pain were selected through purposive sampling technique. Data was analyzed using SPSS version 20 and associations were assessed using chi-square test.
Results: Out of the total 313 participants, 211 were diagnosed as suffering from Spondylolisthesis. Middle age group had significant association with spondylolisthesis. Housewives 57% (21) were found to be associated with Grade 3 Spondylolisthesis. Weight had a significant effect on the preponderance of spondylolisthesis as 46.9% (99) obese had these findings on their MRI. Duration of pain greater than 1 year had significant association with spondylolisthesis, 85.3% (180) participants had these findings on their MRI (P value 0.000). Similarly radiating pain was found to be more prevalent in spondylolisthesis as 80.6% (170) participants with spondylolisthesis as their finding complained of radiating pain
Conclusion: In our survey majority of patients suffering from chronic low back pain had Spondylolisthesis (67.4%). Future studies should focus on measures that specify the risk factors of Spondylolisthesis and target towards its intervention.

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INTRODUCTION

Low back pain is a common and significant source of morbidity for adults.[1] It persists as a condition with a considerably high incidence and prevalence.[2] Chronic low back pain has become one of the cardinal causes of disability in the industrialized world with reported lifetime prevalence of up to 85%.[3] Back pain accounts for second most common symptom-related reason for clinician visits in the United States. Up to 84 percent of adults have low back pain at some point in their lives. The spectrum of illness and morbidity affiliated with low back pain is vast[4] following a new episode; the pain typically ameliorates substantially during the initial 4-6 weeks but not completely. In majority of afflicted people the pain and associated disability subsists for months; however, only a meager proportion remains severely disabled.[2] For many individuals, episodes of back pain are self-limited and winds up without procuring any specific therapy. For a handful of affected, however, back pain is recurrent or chronic, causing significant pain that intermeddles with employment and quality of life. Rarely, acute back pain serves as a portent of serious medical illness, including infection, malignancy, or other systemic disease.[4] Back pain has a substantial impact on lifestyle and quality of life. According to a survey conducted in USA it was found that 72 percent of those who undertook treatment for back pain relinquished exercising or sports-related activities out of which 60 percent alleged that they were unable to perform some daily activities.[5] The differential diagnosis for back pain includes a wide gamut of conditions like degenerative disease, infection, inflammation, tumors and trauma.[6]

However it is evident that morphological abnormalities of the joints in the lumbar spine are a significant cause of low back pain, segmental instability and an antecedent factor in the development of spondylolisthesis.[7] Lumbar spondylolisthesis remains a significant source of back pain and disability.[8] Spondylolisthesis is defined as the anterior migration, or slip, of one vertebra in relation to the next caudal vertebra.[9] Degenerative Spondylolisthesis is one of

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the major causes for low back pain and its etiology is multifactorial interlinked with other pathologies, like spinal stenosis, disc degeneration and zygapophysial joint osteoarthritis.[10,11]

Among adults 4–8% has a spondylolisthesis in their spine[12] the most common location for spondylolisthesis among adults is at the L4/5 level.[13,14] Pars interarticular, portion of the lumbar spine joining the upper and lower joints[15] is most commonly affected at L5 (12) in 90% of cases. The majority of the defects occurring at L5 are bilateral. Pars defects can occur at L4 and above, but these are much less common.[12]

Although the prevalence of spondylolisthesis augments with age, few studies have focused on different age groups in relation to this condition.[16] Also knowledge about the progression or onset of spondylolisthesis is limited[15] and studies among men have been insufficient.[16] Keeping these three objectives in mind and scarcity of research on them in our part of the world, this study was proposed to fill lacuna in the existing pool of knowledge to provide introspection on the frequency of spondylolisthesis, its associated factors and other disorders related to chronic low back pain.

METHODS

This cross sectional study was conducted from April 2012 to December 2012 for a time duration of 9 months .Patients were selected from four Hospitals consisting of two private and two government tertiary care hospitals. The hospitals were located in different districts of Karachi and represented the entire target population of the City. A sample size of 196 patients was calculated based on the prevalence of 85% (3) as mentioned in studies and utilizing the standard formula of prevalence as

$$n= z^2 p (1-p)/d^2$$

The sample size was inflated to 315 to accommodate non response and incomplete questionnaires. The sample was selected through purposive sampling technique with non response by just 2 subjects. Participants consisted of all patients with complaint of chronic low back pain (n=313), which was defined as pain lasting more than 3 months.[17]

The inclusion criteria comprised of both males and females aged above 15 years suffering from chronic low back pain that had been diagnosed by a physician on the basis of X ray lumbar spine including antero-posterior (AP), lateral and oblique view with patients in standing position and further confirmed by MRI. As mentioned in literature MRI has been indicated for those with persistent low back pain or more than 12 weeks of low back pain (18). They were then referred to the physiotherapy department by the physicians.

Exclusion criteria consisted of acute traumatic cases, cases due to infection or tumors, those who had undergone lumbar spinal surgery or invasive procedure within the last 3 months and cases of chronic low back pain who appeared without X ray or MRI. Also excluded were cases not willing to participate in the study.

The outcome measure was Spondylolisthesis and was defined as anterior migration, or slip, of one vertebra in relation to the next caudal vertebra.[9] The presence of Spondylolisthesis was assessed from L1 to S1. Spondylolisthesis was categorized using the standard Meyerding Grading Scale for assessing the magnitude of slip with Grade 0: no slip, Grade I: 1–25%, Grade II: 26–50%, Grade III: 51–75% and Grade IV: 76–100%.[19] Remaining cases comprised of disc prolapse, spinal stenosis and vertebral fractures.

Participants were briefed on the objectives of the research and consent was taken prior to inclusion in the research. Proforma based interview was conducted and questionnaire was developed in both English and Urdu and filled by the researchers themselves. For clarity the questionnaire was evaluated and revised by a physician and two orthopedic surgeons. Anthropometric measurements were obtained. Obesity has been implicated in the degeneration of spine and spondylolisthesis[17,20] hence the questionnaire comprised of questions regarding age, gender, obesity, education, physical work and sedentary work which are known risk factors associated with chronic low back pain.[1]

For the purpose of analysis categorization of some variables was performed as follows. Body mass index (BMI) (kg/m^2) was calculated from the height and weight measures according to international criteria and categorized as underweight (<18.5), normal (18–24.9), overweight (25–29.9), and obese (=30).[21]

Pain duration (< 1 year and > 1 year), as recurrence of pain from initial episode to next 12 months is common[22] and Pain score (1-3 Minimum, 4-6 Moderate and 7-10 Maximum).

Entire analysis was performed using SPSS version 20. In lieu of errors data was cleaned prior to analysis. It was initially entered into Microsoft excel and all inconsistencies were resolved. P value of 0.05 was taken as significant. For descriptive statistics frequency and percentages were calculated as entire data was categorical. While association between spondylolisthesis grades and risk factors obesity, gender, age and duration of pain was determined using chi square.

RESULTS

Out of the total 313 participants who participated in the study, on MRI findings 25 (8%) had spinal stenosis,

29 (9.3%) had vertebral fracture, 48 (15.3%) had disc prolapsed and 211 (67.4%) had spondylolisthesis. According to the severity of the grades, 71 were in Grade 1 of spondylolisthesis, Grade 2 had 101 participants, Grade 3 had 37 and grade 4 had 2 participants.

When MRI findings were associated with different factors some significant observations were seen. When gender was compared with MRI findings, spondylolisthesis was seen to be most common which was more prevalent in females 53.1% (n=112). Out of the remaining, vertebral fractures was seen more in males 55.2% (n=16) and disc prolapse was seen more in females 56.2 %(n=27).

When age was associated with causes of chronic backache, spinal stenosis and vertebral fractures were more common in younger population where 15 (60%) had spinal stenosis and 22 (75.9%) had vertebral fracture findings. In Middle age group 25 (52.1%) had disc prolapse and 108 (51.2%) had spondylolisthesis **(*P*=0.025).**

Graph 1: Frequency of Spondylolisthesis in Chronic Low Back pain Patients

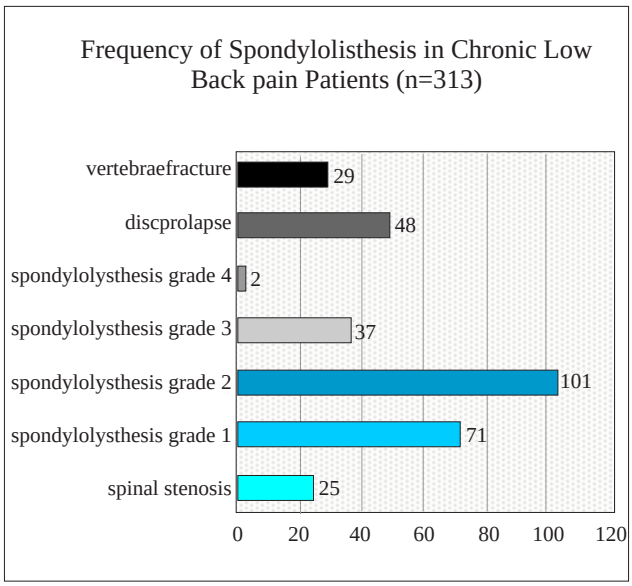

Table 1: Association of Different Variables with Spondylolisthesis

		SPONDYLOLISTHESIS								*P Value*
		Grade I (n=71		Grade 2 (n=101)		Grade 3 (n=37)		Grade 4 (n=2)		
		n	%	n	%	n	%	n	%	
Age in Groups	Young	32	45.1	49	48.5	9	24.3	1	50	0.003
	Middle	35	49.3	50	49.5	22	59.5	1	50	
	Old	4	5.6	2	2	6	16.2	0	0	
Gender	Male	37	52.1	46	45.5	16	43.2	0	0	0.692
	Female	34	47.9	59	54.5	21	56.8	2	100	
Occupation	Government	21	29.6	36	35.6	9	24.3	0	0	0.024
	Private	28	39.4	31	30.7	7	18.9	0	0	
	House Wife	22	31	34	33.7	21	56.8	2	100	
BMI	Underweight	1	1.4	0	0	0	0	0	0	0.000
	Normal	14	19.7	7	6.9	0	0	0	0	
	Overweight	37	52.1	44	43.6	9	24.3	0	0	
	Obese	19	26.8	50	49.5	28	75.7	2	100	
Aggravating Factors	Repetitive hyperextension of Lumbar Spine	26	36.6	21	20.8	20	54.1	1	50	0.001
	Stress	18	25.4	15	14.9	7	18.9	0	0	
	Physical Activity	27	38	65	64.4	10	27	1	50	
Relieving Factors	Complete bed rest	17	23.9	22	21.8	17	45.9	1	50	0.375
	Forward Flexion	18	25.4	22	21.8	9	24.3	0	0	
	Physiotherapy	36	50.7	57	56.4	11	29.7	1	50	
Spasm	Yes	42	59.2	43	42.6	22	59.5	1	50	0.06
	No	29	40.8	58	57.4	15	40.5	1	50	
Intensity of Pain	Mild	42	59.2	34	33.7	15	40.5	1	50	0.000
	Moderate	26	36.6	59	58.4	18	48.6	1	50	
	Severe	3	4.2	8	7.9	4	10.8	0	0	
Pain Duration	Less than one Year	15	21.1	14	13.9	1	2.7	1	50	0.000
	Greater than one Year	56	78.9	87	86.1	36	97.3	1	50	
Radiating Pain	Yes	51	71.8	86	85.1	31	83.8	2	100	0.000
	No	20	28.2	15	14.9	6	16.2	0	0	
Pain associated with weakness in Legs	Yes	45	63.4	74	73.3	27	73	2	100	0.163
	No	26	36.6	27	26.7	10	27	0	0	
Physiotherapy Treatment for the pain	Yes	67	94.4	92	91.1	35	94.6	2	100	0.046
	No	4	5.6	9	8.9	2	5.4	0	0	

Considering occupation as a risk factor for chronic low back pain, majority of the housewife's 37.4% (79)14 were found to be suffering from spondylolisthesis. Participants working in private sector were majority 55.2% (16) found to be suffering from vertebral fractures. While spinal stenosis was more common in participants 36% (9) working in government sector.

Weight had a significant effect on the preponderance of spondylolisthesis as 46.9% (99) obese had these findings on their MRI **(*P*= 0.005).** Majority of these obese 75.7% (28) had Grade 3 spondylolisthesis.

Duration of pain greater than 1 year had significant association with spondylolisthesis, 85.3% (180) participants had these findings on their MRI **(*P*< 0.0001).** Similarly radiating pain was found to be more prevalent in spondylolisthesis as 80.6% (170) participants with spondylolisthesis as their finding complained of radiating pain **(*P*<0.0001).** Severity of pain was seen more in vertebral fractures as 51.7% (15) cases complained of severe pain **(*P*<0.0001).** Pain was of moderate intensity in majority of the cases 49% (104) suffering from spondylolisthesis. Effect of change in posture on intensity of pain was seen maximum in spinal stenosis where 72% (18) complained of increase in pain. Pain associated with spondylolisthesis was found to be associated with weakness in legs as 70% (148) complained of this symptom.

When muscle spasm was taken into account only vertebral fracture positive findings 65.5% (19) had less spasm as compared to spinal stenosis where 60% (15) had spasm, disc prolapse where 54% (26) had spasm and spondylolisthesis where 51% (108) had spasm. Factors that were found to be aggravating chronic back pain in spondylolisthesis were repetitive hyperextension of lumbar spine where 32.2% (68) participants identified it as an aggravating factor. When stress was taken into account 19% (40) took it for an aggravating factor while physical activity was branded as an aggravator by 48.8% (103) participants.

Physiotherapy was found to be a major relieving factor in all causes of chronic low back pain. In disc prolapse patients 52% (25), in spondylolisthesis 49.8% (105) and in vertebral fracture 48% (14) affirmed its efficacy as a reliever.

DISCUSSION

This study brought to attention the ontological causes of chronic low back pain and prevalence of spondylolisthesis among residents of Karachi in different age groups. It was imperative as studies are scarce on the prevalence of the disorder, most studies have focused on the anatomic features associated with spondylolisthesis among symptomatic patients.[23] Our study provided an in depth view on the regnant disorders that incite chronic low back pain. Additionally knowledge on the onset or progression of spondylolisthesis was limited.[14] In our survey majority of patients suffering from chronic low back pain had spondylolisthesis (67.4%) whereas minor proportion of participants had spinal stenosis (8%), vertebral fracture (9.3%) and disc prolapse (15.3%). These results cannot be compared on national level as data is limited.[14,16]

Our study results found that most patients had grade 2 spondylolisthesis and grade 1 spondylolisthesis with very few in grade 3 and grade 4 which was in accordance with previous studies.[20] Also in our study gender association with spondylolisthesis was similar to international findings with more females (53.1%) affected by the condition but this was slightly less as compared to international studies that have denoted females 3 times more likely to develop this condition compared to male gender.[13] Internationally studies have shown the prevalence among females range from 6% in Taiwan[8] to 8% in Denmark[14] to 20%–25% in the USA,[16] whereas among males estimates range from 3% in Taiwan[8] and Denmark[14] to 4%–8% in the USA.[16] Our results were contrary to the notion that spondylolisthesis enhances with age as most patients approximately 51.2% were seen in the middle age group compared to old age group. Also literature has shown that most patients of old age group are either asymptomatic or negate receiving medical attention despite radiographic evidence of abnormalities.[20] Our study validated further the association of spondylolisthesis with weight by BMI classification concurring with previous literature as most of the obese individuals (46.9%) were seen suffering from it.[1,17,20] However it was seen in our study that obese were affected by grade 3 spondylolisthesis rather than the more common milder grades.[22]

According to recent literature complete pain resolution in spondylolisthesis is uncommon with recurrence within the next 12 month.[22] Our results were consistent with similar findings; pain was found having significant association with spondylolisthesis. One possible explanation elucidated by literature is that treatment for chronic LBP usually includes seeing multiple health care professionals which encourages further medical consultations and persistence of chronic LBP.[24] Another factor responsible as stated in previous studies is that due to consensus guidelines from national or international organizations, the treatment of spondylolisthesis embarks high dependency on patient and physician expectations and preferences[10] it has been reported that patients presenting with spondylolisthesis may have any combination of low

back pain, neurogenic claudication, vesicorectal disorder, and radiculopathy.[25] The participants in this study also displayed radiating pain although the severity was moderate (80.6%).

Our results add to the accumulating data making it blatant that prevalence of spondylolisthesis is greater among those reporting greater physical activity. The same findings occurred in Taiwan where spondylolisthesis was found high among those with a history of frequent strenuous exercise compared to those without it.[8]

Our study had few limitations. Though this study was in accordance with our objectives of finding frequency of Spondylolisthesis in patients with chronic low back pain yet it precluded our ability to determine the temporal relation between spondylolisthesis and physical activity, making the clinical relevance of this observation shaky. Looking from a mechanical perspective, this association does have biologic plausibility. Physical activity causes increased loads on the lumbar spine, which cumulatively could contribute to spondylolisthesis via degeneration of facet joints and or intervertebral discs.[20]

According to previous studies radiographs of the spine have limited sensitivity compared with other imaging modalities in detecting spinal disorders. Furthermore, radiographic defects of the pars interarticularis may not be symptomatic.[26] The data gathered from patients were from four separate hospitals located in different districts hence it is possible that results of X ray or MRI may differ between the facilities leading to bias. Also treatment procedures for spondylolisthesis were not considered in this study. Smoking as a risk factor was not studied although there are studies which signify it as a risk factor[27] while others negate this factor making it a dubious factor.[17] Depression has been pointed out as a risk factor not considered in our study.[28]

While there were few weaknesses strengths cannot be overlooked in this study. We reported on the frequency and correlates of spondylolisthesis in a vast range of age groups. Diagnosis although based on radiological information involved qualified physicians and physiotherapists. Data was collected from four tertiary care hospitals at different locations within the city and patients from all socioeconomic status were included. Questionnaire was checked by supervisors and information was collected by the primary investigators themselves. Meyerding grading scale was used which is an internationally used scale for measure of spondylolisthesis and the refusal rate was extremely negligible.

The increasing prevalence of spondylolisthesis and other low back pain pathologies is a complex public health problem and demands solutions.[17] This study provides valuable and timely information on a common, disabling and costly condition. To understand the risk factors we must conduct studies in greater detail and with a larger sample size to constraint this issue. Spondylolisthesis progression has been minimally studied hence additional prospective studies are needed to elucidate if progression occurs constantly over time.[20] Thus, a clearer understanding of spondylolisthesis is needed to inform discussions with patients and to formulate evidence-based treatment plans. Role of physiotherapy is still not clear which can only be provided through prospective study designs. Public health interventions should be designed to target high risk individuals. Efforts to improve function and constrain costs of back pain will need to address issues of causality and self-management if we are to adequately address this health and health care challenge.

CONCLUSION

In our survey majority of patients suffering from chronic low back pain had Spondylolisthesis (67.4%). Future studies should focus on measures that specify the risk factors of spondylolisthesis and target towards its intervention.

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