# INCIDENCE OF LUMBOSACRAL TRANSITIONAL VERTEBRAE IN LOW BACK PAIN PATIENTS.

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## ABSTRACT

The aim of this study is to determine by plain radiography if there is a relationship between lumbosacral transitional vertebrae (LSTV) and low back pain (LBP)
The correlation or relationship between LSTV and LBP has been highly controversial. Widely varying and contrasting findings have been reported by various investigators. While some studies have indicated the etiological significance of LSTV in LBP, others have strongly refuted this.
300 radiographs of patients seen in 1999 and 2000, in the Radiology department, complaining of LBP were randomly chosen. The radiographs were examined, studied and data collected were analysed and reported.
Of the total number of patients seen, 143 (48%) were males and 157 (52%) were females. The incidence of LSTV was found to be 37% and with a male preponderance.
This incidence of 37% is quite high and can not be discountenanced.

## INTRODUCTION

Low back pain (LBP) is quite a common ailment affecting about 80% of the populace in their life time.[1] Numerous causes have been attributed to it. A long list exists, but the enlistment of LSTV as one of the causes has resulted in a lot of controversy. Lumbosacral transitional vertebrae (LSTV) are congenital anomalies of the lumbosacral spine, involving lumbarization and sacralization. Some researchers have conducted researches and shown from their results that there is a correlation between LSTV and LBP.[2 - 6] On the other hand some other researchers have vehemently stated that there is no relationship between LSTV and LBP.[7 9]

This controversy has been quite intriguing and has been the stimulus for carrying out this present study. The intention is to examine in details the incidence of this anomaly in the LBP patient in our environ.

Unfortunately there has not been any study that utilized monitoring instruments or equipments apart from X-rays in ascertaining or refuting previously reported data. Probably such instruments may never come in existence or will be produced in the near future. In the absence of such instruments, each author had in the past utilized different parameters to try and ascertain the relationship and had come out with varied and contrasting findings.

The aim of this study is to attempt to use the incidence of this congenital anomaly to establish a relationship between it and LBP.

## MATERIALS AND METHODS

300 Lumbosacral radiographs of LBP patients were randomly chosen from the Radiology Department of the National Orthopaedic Hospital Igbobi, Lagos in a two-year period (1999 and 2000). The ages ranged between 14 years and 81 years and both sexes were involved. Frontal (AP) and lateral lumbosacral regions were evaluated. The radiographs were examined, data collected and analysed. Previous works were also analysed and compared with our data.

## RESULTS

Fig 1 shows the representation of the sexes in the sample population.

A higher number and percentage of females (157, 52%) were represented in the sample population. 143 males (48%) were present in the sample population.

Table 1 show that 112 cases had LSTV while 188 had normal spines. This gives an incidence of 37%, and a ratio of 1:1.7 (approximately one case of LSTV to every two normal spined patients presented with LBP.

In Table 2, of the total number of males (143) seen, 66 (46%) had LSTV and 77 (54%) had normal spines. This shows that the ratio of incidence of LSTV male to normal males is 1:1.17 (which is approximately 1:1). Of the 157 females seen 46 (29%) had LSTV and 111 (71%) had normal spines. Therefore the ratio of incidence of LSTV females to normal females is 1:2.4 (approximately 2:5). Of the 112 patients with LSTV, 66 (59%) were males and 46 (41%) were female. Therefore the ratio incidence of LSTV in male to females is 1.4:1 which is approximately 3:2.

Table 3 shows that sacralization is the commoner LSTV. The incidence ratio of sacralization to lumbarization is approximately 2:1. The ratio of male to female, with sacralization is 3:1. The ratio of incidence of sacralization to lumbarisation in the male is approximately 5:1.

## DISCUSSION

Our present study shows that the incidence of LSTV in the sample population is 37%. This is quite a high incidence. Certainly the high incidence can not be overlooked. Our finding agrees with the high incidences recorded by Dai (35%), Sugihara (34%) and Castellvi *et al* **(**30%)**.** [5, 10, 11] Mogara *et al* **reported** a fairly high incidence (21.5%), and from their study showed that there is some evidence that LBP when associated with sacralization may be more severe.[3] Incidentally, our present study shows that sacralization is the predominant LSTV anomaly encountered. This further lends credence to the fact that there must be some relationship between LSTV and LBP.

The Lumbosacral spine is important for the following reasons:-

- Protects the spinal cord and spinal nerves.
- Plays an important role in posture and locomotion.
- Supports the weight of the body.
- Transmits the weight of the head and trunk to the lower limbs.

The major weight of the trunk when in the upright position is borne by skeletal structures. It is probable that the lumbar spine experiences more abuse from normal functions than any other part of the human skeleton.[12] To be able to give support to, and bear the weight of the body, the integrity of all the vertebrae in the spine, particularly in the lower back must be maintained. It is expected that jeopardy of this integrity by any pathology, either congenital or acquired, will affect the stability of the spine and therefore its biomechanics. It is on this basis that the presence of LSTV is believed to be associated with an increased liability for a patient to develop low back pain.

Since the spine is subjected to extreme stress on a daily basis, it is not surprising therefore that the prevalent ailment encountered in the Lumbosacral spine is low back pain. Low back pain is one of the most common rheumatological symptoms presented to the general practitioner.[13] The prevalence of low back pain in the population and the diagnostic problem it poses have resulted in extensive research work being done to help ascertain the etiology and the management of this condition. Various classification systems for patients with LBP have been described in the literature.[14 - 16] From various works, it has been ascertained that the etiology of LBP in 70 80% of victims in the world population is generally ascribed to

spondylosis, spondylolysis, spondylolisthesis, facet lesions, discal abnormalities, vertebral instability or degenerative osteoarthritis seen commonly in patients above 50 years. The others, such as congenital lumboscral variants like spina bifida, scoliosis and lumboscral transitional vertebrae are seen presenting in the younger age group.[4] Many lists of the differential diagnosis of LBP and sciatica have therefore been given. In some, LSTV has been included whereas in some it has been excluded. There is a great controversy as to LSTV being an etiology of LBP. LSTV in themselves are usually associated with stability of that segment and pain is more likely to arise in the segment immediately above the site of the abnormalities, in the disc or the facet joint.[2, 6, 17 - 19]

Lumbosacral transitional vertebrae occur as a congenital anomaly in the segmentation of the lumbosacral spine. Lumboscral transitional vertebrae include lumbarization and sacralization of the lumbosacral region.[19] Olanrewaju states that sacralization is the most distal lumbar assumption of sacral vertebrae features and lumbarization is the proximal sacral assumption of lumbar vertebrae feature.[4] The transition involves either the fifth lumbar vertebra (sacralization) or the first sacral vertebra (lumbarization). Lumbarization is either complete or incomplete fusion of the upper sacral vertebrae, while sacralization is either complete or in complete fusion of L5 vertebra to the top of the sacrum. Sacralization of the fifth lumbar vertebra is therefore the incorporation in whole or in part into the sacrum. Lumbarization of the first sacral vertebra refers to the segmentation and incorporation of this vertebra into the lumbar spine.[20]

Olanrewaju recorded a high incidence of sacralization in his study.[4]

This present study also shows that sacralization is predominant in males. Despite the higher number of females present in the sample population, more males were seen to have LSTV and also presented with sacralization, which causes more severe LBP. This establishes a relationship between the symptom (LBP), the pathology (LSTV sacralization) and the sex of the patient (male). This study also reveals that for every male patient seen with LBP, there is about 50% probability of that patient having LSTV.

Despite the high prevalence of lumbosacral transitional vertebrae, little is still known about the biomechanics of this condition.[21] Clinicians should however consider the possibility that the mechanical low back pain present may be from the other relationships well established with LSTV. They are as follows:-

1) In the presence of transitional Lumbosacral segmentation, the lumbosacral intervertebral disc is significantly narrower than its counterpart in non-transitional spines.[18, 22 - 23]
2) The incidence of disc herniation is found to be statistically higher, and the mean age of occurrence lower in cases with transitional vertebrae than in those without.[24 -25] This suggests that transitional vertebrae may be one of the risks factors for lumbar disc herniation.
3) A relationship between transitional vertebrae and the degree of slippage in spondylolytic spondylolisthesis has been established.[19, 26] The patients with sacralization and the isthmic defect in L4 showed more anterior slippage than the patient with the isthmic defect in L4 without transitional vertebrae.
4) Though LSTV in themselves are usually associated with stability of that segment, pain is more likely to arise in the segment immediately above the site of the abnormality in either the disc or facet joint. Brault *et al* reported a case of a successful surgically treated LBP from the facet joint contralateral to a unilateral anomalous lumbosacral articulation (Bertolotti's Syndrome).[6]

## CONCLUSION

There is a high indence of lumbosacral transitional vertebrae (LSTV) in low back pain (LBP) patients. This cannot be overlooked. This study suggests that there is a strong relationship between the congenital anomaly LSTV and LBP.

**Table 1 Incidence Of Lumbosacral Transitional Vertebrae In 300 Patients With Low Back Pain**

| | Total No. Of Cases | Percentage |
|---|---|---|
| Lumbosacral Transitional Vertebrae LSTV | 112 | 37% |
| Normal Spines | 188 | 63% |
| **TOTAL** | **300** | **100%** |

**Table 2: Sex Incidence Of Lumbosacral Transitional Vertebrae In 300 Patients With Low Back Pain**

| | No Of Males (%) | No Of Females (%) | Total |
|---|---|---|---|
| Lumbosacral Transitional Vertebrae | 66 (46%) | 46 (29%) | 112 |
| Normal Spines | 77 (54%) | 111 (71%) | 188 |
| **TOTAL** | **143 (100%)** | **157 (100%)** | **300** |

**TABLE 3: Incidence Of Lumbarization And Sacralization In 112 Patients With Lumbosacral Transitional Vertebrae**

| | MALE | FEMALE | TOTAL | % |
|---|---|---|---|---|
| Sacralization | 54 | 18 | 72 | 64% |
| Lumbarization | 12 | 28 | 40 | 36% |
| **TOTAL** | **66** | **46** | **112** | **100%** |

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