CASE REPORT

COMPLETE FUSION OF FIFTH LUMBAR VERTEBRA WITH SACRUM: AN OSTEOLOGICAL CASE REPORT
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HOW TO CITE THIS ARTICLE:
Shiksha Jangde, Ranjana S. Arya, Shashi Paikra. “Complete Fusion of Fifth Lumbar Vertebra with Sacrum: An Osteological Case Report”. Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 27, July 06, 2015; Page: 4061-4065.

ABSTRACT: Lumbosacral region of the body not only protects the spinal cord and related structures but also transmit the body weight to lower extremity and maintains the body posture. Sacralization of the 5th lumbar vertebrae, is a congenital vertebral anomaly of the lumbosacral region and may be unilateral or bilateral. Although, sacralization is not a serious anomaly, perhaps no more than an anatomical variant, the fusion of the lumbrosacral joint may cause low back pain, disc herniation, cervical ribs, Bertollotti’s syndrome and difficulty during labor. To highlight the complication of sacralization and its related impact on the body, we report a case of complete fusion of 5th lumbar vertebra with sacrum (sacralization). The relationship between incidence of sacralization with low back pain is debatable but still the present study may help anatomists, clinicians and surgeons to know the complications of sacralization and its impact on the body that in turn help in diagnostic and therapeutic management of illness around lumbosacral region. Future studies need to focus on identifying other parameters that are relevant to distinguishing lumbosacral variations and associated disorders.

KEYWORDS: Lumbosacral region, Sacralization, Congenital vertebral anomaly, Low back pain.

INTRODUCTION: Lumbosacral region of the body not only protects the spinal cord and related structures but also transmit the body weight to lower extremity and maintains the body posture. In lumbosacral region, anatomical variations are related with change in the number of sacral vertebra by union of fifth lumbar vertebra or first coccyx with sacrum (sacralization) or deletion of first sacral vertebra (lumbarization). This alteration may contribute to incorrect identification of a vertebral segment. The prevalence of anatomical variation in the lumbosacral region reported in the literature ranges from 4 to over 35%. Many of the studies further divided above variations into lumbarization and sacralization with a mean prevalence of 5.5% and 7.5% respectively.¹

Sacralization of the 5th lumbar vertebrae, is a congenital vertebral anomaly of the lumbosacral region² and may be unilateral or bilateral. The occurrence of sacralization may be linked to its embryological development and osteological defects, results from mutations in the HOX- 10 and HOX-11 paralogous genes.³ Sacralization is varied by race and incidence as is reported by various previous studies such that in Arabs and Indians⁴ and Americans⁵ and increased incidences were observed by Tini (1977)⁶ within families. Although, sacralization is not a serious anomaly, perhaps no more than an anatomical variant, fusion of the lumbosacral joint may cause low back pain, disc herniation, cervical ribs, Bertollotti’s syndrome and difficulty during labor. The clinical significance of sacralization lays in the findings that it causes fifth lumber nerve compression resulting in low back pain (LBP). The exact diagnosis of low back pain may be challenging at times, and in cases with anatomical variations, the diagnostic and therapeutic...
difficulties can increase tremendously. To highlight the complication of sacralization and its related impact on the body, we report a case of complete fusion of 5th lumbar vertebra with sacrum (sacralization).

CASE REPORT: Sacrum with complete fusion of fifth lumbar vertebrae was found during routine osteology class of MBBS students in our institute. Sacrum was observed carefully for the presence of number of sacral elements, sacral foramen, spinous processes and articular surfaces. According to classification given by Castellvi et al, our case belongs to type III-B i.e. fusion of both the transverse processes with the ala of sacrum, and bodies also fused with first sacral segment. The sacrum had six bodies with 5 pairs of sacral foramen by incorporation of 5th lumbar vertebra. On ventral surface, the joint line present between 5th lumbar and 1st sacral body (Fig.
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1). Sacral canal was opened on the dorsal surface with fusion of lamina. The spines of all sacral segments were well developed. The apex of sacral hiatus being at the junction between S4 and S5 and was inverted ‘U’ shaped (Fig. 2). The lateral articular surface extends up to upper 3 and ½ vertebral bodies (Fig. 3).

DISCUSSION: In modern life low back pain (LBP) is common complaint. One of the causes may be the sacralization of lumbar vertebra. The relationship between LBP and sacralization is not clear. Numerous studies have found no significant correlation between sacralization and low back pain, while others have. In 1917, Bertolotti was the first to describe an association of sacralization and the low back pain.

![Image of sacralized vertebra](image.jpg)

Fig. 3: Lateral aspect of sacralized vertebra

However, this has remained a matter of debate in the literature for almost a century now. Pain may result from the pressure on nerves or nerve trunks, ligamentous strain around the sacralization, compression of soft tissues between bony joints due to L5 sacralization. The sacralized transverse process may form a pseudoarthrosis with the ilium and degenerative sclerosis may appear around the false joint. This may be a site of low back pain. The lumbar nerve roots may be altered. When a lumbosacral transitional vertebra is present and this probably could be a risk factor of low back pain. Although there is some debate, it is possible that sacralization of 5th lumbar vertebra contributes to the development of degenerative spondylolisthesis, lumbar disc degeneration and herniation, and low back pain (LBP).

Although, sacralization may be as one of the causes of low back pain, but is asymptomatic in many cases especially bilateral type (same as in our case report). Probably low back pain occurs due to chronic faulty biomechanics. According to M. U. Eyo et al 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 sacralization is believed to be associated with an increased liability for a patient to develop low back pain.
In females the sacralization may cause greater difficulty during labor because of less mobile pelvis (lumbo-sacral joint) and may cause low back pain. It is one of the important factors in the emergence of lumbar disc herniation which usually occurs at the level above the lumbosacral transitional vertebra rather than at the level of transitional vertebra in patient with low back pain. In case of disc herniation above the sacralization, sacral nerve may be compressed leading to sciatica. In sacralization, usually L5-S1 intervertebral disc becomes thin and narrow, this abnormality is found by X-ray. Due to sacralization of lumbar vertebra there could be difficulty in numbering the vertebrae and modification in the configuration of lumbosacral transitional vertebra for various surgical interventions around sacral region. The lumbosacral transitional vertebra transmits the weight of upper trunk of human body therefore the problems related with biomechanical movements of waist may crop up. Vergauwen et al. demonstrated that the abnormal vertebra does not constitute a risk factor for spine degenerative changes but, when degeneration occurs, it focused on the suprajacent level of the transitional vertebra.

The relationship between incidence of sacralization with low backache patients is debatable but still the present study may help anatomists, clinicians and surgeons to know the complications of sacralization and its impact on the body that in turn help in diagnostic and therapeutic management of illness around lumbosacral region.

CONCLUSION: From above discussion we can conclude that future studies need to focus on identifying other parameters that are relevant to distinguishing lumbosacral variations and associated disorders. Many unexplained cases of low-back pain, especially in young adults, may be investigated and treated keeping sacralization as one of the etiologic factor.

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Date of Submission: 01/07/2015.
Date of Peer Review: 02/07/2015.
Date of Acceptance: 03/07/2015.
Date of Publishing: 06/07/2015.