

Research Article**A Study of Canal Body Ratio of the Lumbar Vertebrae Measured in Antero-Posterior Radiographs**Shalini Chaudhary¹, Sarvesh², A.P.S. Batra³¹ Professor, Department of anatomy, B.P.S. Govt. medical college for women, Sonapat, Khanpurkalan, Haryana, 131305² Assistant professor, Department of anaesthesia, B.P.S. Govt. medical college for women, Khanpurkalan, Sonapat, Haryana, 131305³ Professor, Department of anatomy, B.P.S. Govt. medical college for women, Sonapat, Khanpurkalan, Haryana, 131305***Corresponding author**

Shalini Chaudhary

Email: dr_chaudhary23@rediffmail.com

Abstract: For present study, antero posterior radiographs of lumbar spine of three hundred adult subjects of Sonapat District were utilized. These radiographs were of known sex i.e. hundred & fifty males and hundred & fifty females and of known age group (between twenty five and forty years of age). The parameters used in the study are transverse diameters of spinal canal, antero-posterior diameters of vertebral bodies. Making use of these parameters canal body ratio is calculated. The values less than the lower limits of the calculated range may be suggestive of spinal canal stenosis, while the values more than the upper limits of the calculated range may be suggestive of intraspinal tumor at that particular segmental level for males and females respectively.**Keywords:** antero posterior radiographs, canal body ratio.

INTRODUCTION

The etiology in many of low backache complaining patient is narrowing of lumbar canal. The lumbar part of spinal canal encloses the cauda equina. Narrowing of the canal which can be either developmental or acquired will lead to compression of the cauda equina and subsequent pain; it may be associated with neurological symptoms and signs. Hence it is of great clinical value to measure the dimensions of spinal canal. Many workers have studied various dimensions of lumbar vertebrae, especially the dimensions of spinal canal [1-2].

In the lumbar region the spinal canal is triangular in shape and is limited anteriorly by posterior surfaces of vertebral bodies of lumbar region, inter vertebral discs and posterior longitudinal ligament covering them; laterally by pedicles; posteriorly laterally by laminae and ligamenta flava and posteriorly by junction of laminae with spinous processes. [3]. Therefore, use of plain radiography is made in the present work to study canal body ratio of lumbar vertebrae for population of sonapat district.

MATERIAL AND METHODS

For present study, radiographic measurements were obtained from normal antero-posterior radiographs of lumbar spine of 300 adult subjects (150

males & 150 females) between 25 to 40 years from Radiology Department of B.P.S.G.M.C. for women Khanpur kalan sonapat. These radiographs were diagnosed as normal by experienced radiologists. The radiographs showing any obvious abnormality were excluded from the study.

The measurements were made by using a scale calibrated to 0.5 mm. The dimensions of all lumbar vertebrae were studied. The inter pedicular distance was obtained from the antero-posterior radiographs of lumbar spine. This corresponds to transverse diameter of spinal canal and was obtained by measuring the minimum distance between the shadows of pedicles of same vertebra. Transverse diameter of vertebral body is the minimum distance across the waist of the vertebral body. We calculated canal body ratio by dividing inter pedicular distance with transverse diameter of vertebral body.

OBSERVATIONS AND RESULTS

This observation table shows that the canal body ratio is almost constant for each level of lumbar spine. It is approximately 0.6 at all lumbar levels. This means that the transverse diameters of spinal canal and vertebral body go on increasing proportionately from above downwards.

Table-1: Canal body ratio at each segmental level in both sexes

| Level | Canal body ratio (male) | Canal body ratio (female) |
|-------|-------------------------|---------------------------|
| L1 | 0.55 | 0.56 |
| L2 | 0.56 | 0.57 |
| L3 | 0.56 | 0.57 |
| L4 | 0.54 | 0.57 |
| L5 | 0.57 | 0.58 |

Table-2: Comparison of canal body ratio between previous studies and present study at each segmental level in both sexes

| Authors | Canal – body ratio | | | | | | | | | |
|--|--------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | Male | | | | | Female | | | | |
| | L ₁ | L ₂ | L ₃ | L ₄ | L ₅ | L ₁ | L ₂ | L ₃ | L ₄ | L ₅ |
| Amonoo Kuofi H. S. [5] (Nigerians) | 0.55 | 0.53 | 0.53 | 0.52 | 0.54 | 0.57 | 0.57 | 0.58 | 0.56 | 0.56 |
| Sudha Chhabra et al. [6] (North Indians) | 0.61 | 0.61 | 0.61 | 0.63 | 0.63 | 0.61 | 0.62 | 0.62 | 0.64 | 0.63 |
| Present study (sonapat District) | 0.55 | 0.56 | 0.56 | 0.54 | 0.57 | 0.56 | 0.57 | 0.57 | 0.57 | 0.58 |

The deviation of canal body ratio from its approximate value of 0.6 to one or the other side indicates the possibility of either spinal canal stenosis or intra-spinal tumor. On comparison of “canal –body ratio” between different races, it is found that irrespective of varying canal body measurements the ratio of C/B is remarkably constant (approx 0.6).

DISCUSSION

Diagnosis and management of vertebral column disorder like congenital malformations, deformities, degenerations, trauma and malignant processes got advancement by various imaging techniques like CT Scan, MRI. Even after this revolution radiography remains the mainstay of investigative procedure particularly in rural setup. The knowledge of normal values of canal body ratio in various ethnic groups could be of importance in detecting isolated segmental changes. In the present study attempt has been made to determine standard normal canal body ratio as a preliminary to clinical investigation of transverse spinal canal stenosis as it is suggested that thickening of lamina causes narrowing of spinal canal which reduces the IPD s of the spinal canal and is the second most common cause of narrowing of spinal canal [4].

CONCLUSION

In the present study normal antero-posterior radiographs of lumbar spine of three hundred adult subjects (150 males and 150 females) of Sonapat District are studied. The parameters used in the study are transverse diameters of spinal canal and transverse diameters of vertebral bodies. Making use of these parameters canal body ratio is calculated.

Thus, this study has presented a set of radiographic measurements and results obtained by evaluating normal radiographs of Sonapat District

Subjects. It is found that the canal body ratio remains constant for all lumbar vertebrae all over the world. Furthermore, careful study of these parameters and indices may be useful in radiological detection of clinical conditions like bony spinal canal stenosis, some cases of intraspinal tumors, vertical compressions of vertebral bodies and prolapsed inter vertebral discs.

Ethical clearance: Obtained from ethical committee of B.P.S.G.M.C. for women, sonapat

REFERENCES

- Hinck VC, Clark WM, Hopkins CE; Normal interpedicular distances (minimum and maximum) in children and adults. *Amor. J. Roentgen*, 1966; 97: 141 - 153.
- Eisenstein S; The morphometry and pathological anatomy of the lumbar spine in South African Negroes and Caucasoids with specific reference to spinal stenosis. *J. Bone Joint Surg*, 1977; 59 B: 173 - 180.
- Williams PL, Warwick R; Editors: *Gray’s Anatomy*, 35th edition: 1978; 240.
- Sachs B, Frankel J; Progressive ankylotic rigidity, of the spine (Spondylose rhizomelique). *J. Nerv. Ment. Dis*, 1990; 27: 1 - 15.
- Amonoo Kuofi HS, Patel RJ, Fatani JA; Transverse diameter of the lumbar spinal canal in normal adult Saudis, *Acts Ant.*, 1990; 137: 124-128.
- Chhabra S, Gopinathan K, Chhibber SR; Transverse diameter of the lumbar vertebral canal in North Indians. *J. Anat. Soc. India*, 1991; 41(1):25-32.