



ORIGINAL RESEARCH PAPER

Anatomy

MEASUREMENTS OF CERVICAL VERTEBRAL CANAL IN LATERAL CERVICAL RADIOGRAPHS

**KEY WORDS:** Cervical Vertebral Canal, Vernier Callipers, Radiographs.

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ABSTRACT

**Introduction** - The normal values of measurements in cervical vertebral canal in the available literature are based on the studies of western population. The normal values in Indians have not been well documented. It is necessary that normal values are determined and recorded for ready references in Indian population. **Material and method** - One hundred lateral cervical radiographs of cases referred from different departments to deptt. of radiodiagnosis, NSCB Medical College, Jabalpur, were studied. Anteroposterior diameter of cervical spinal canal and vertebral body was measured and by a metallic vernier calipers. Results - The mean values of anteroposterior diameter at C3, C4, C5 and C6 vertebral canal in females are 16.69, 16.65, 16.90 and 17.05 mm, while in males these are 18.46, 18.33, 18.56 and 19.10 mm respectively. The mean values of Torg's ratio at C3, C4, C5 and C6 cervical vertebral level in females are 1.10, 0.97, 0.97 and 0.94, while in males these are 1.17, 0.95, 0.93 and 0.94 respectively.

**Introduction :**

Significance of size and shape of spinal canal with occurrence of symptoms of spinal cord or nerve root compression has long been recognized. Payne and Spillane[1] in 1957 studied the anteroposterior diameter of cervical spinal canal in lateral cervical radiographs of 70 individuals and found narrower cervical spinal canal in cervical spondylosis cases. It is a known fact that vertebral column morphology is influenced externally by mechanical and environmental factors and internally by genetic, metabolic and hormonal factors (Gray's Anatomy, 38th edition, 1995).

There are seven cervical vertebrae, out of which first, second and seventh differ in structure from the others. The vertebral canal increases in size from second to fifth cervical vertebra and then decreases, so corresponding with the position of the thickest part of the cervical enlargement of the cord.

Different authors have reported different measurements of the normal range of cervical spinal canal at each cervical vertebral level. These measurements obtained from lateral radiographs of the cervical spine show certain amount of discrepancy. These discrepancies are due to variable enlargement factors, mainly the object-film-distance which depends upon individual shoulder widths.

To overcome this difficulty, in 1986 Torg's, Pavlov and coworkers[2] devised a ratio method to determine cervical spinal stenosis. This ratio (titled since then as Torg's ratio or Pavlov's ratio) compares the anteroposterior diameters of vertebral canal and vertebral body. Pavlov et al reported that the ratio method for determining cervical spinal stenosis is more sensitive and more specific than the conventional method in which only the anteroposterior diameter of the spinal canal is measured.

The normal values in the available literature are based on the studies of western population. The normal values in Indians have not been well documented. It is necessary that normal values are determined and recorded for ready references in Indian population.

This work is designed to measure the anteroposterior diameter of cervical spinal canal, canal body ratio in lateral cervical radiographs of normal adults in the population in and around Jabalpur.

**Materials and methods :**

Study was done in the department of Radiodiagnosis, N.S.C.B. Medical College and Hospital, Jabalpur. One hundred lateral cervical radiographs of cases referred from different departments were studied. Anteroposterior diameter of cervical spinal canal and vertebral body was measured and by a metallic vernier calipers with least count of 0.1 mm. Torg's ratio was calculated by dividing

anteroposterior diameter of vertebral canal by anteroposterior diameter of vertebral body. Radiographs showing any spinal column abnormality was not included in this study.

**Result :**

The mean value of anteroposterior diameter at third, fourth, fifth and sixth cervical vertebral canal in females was observed to be 16.69 mm, 16.65 mm, 16.90 mm and 17.05 mm, while in males it was 18.46 mm, 18.33 mm, 18.56 mm and 19.10 mm respectively. The mean value of anteroposterior diameter at third, fourth, fifth and sixth cervical vertebral body in females was observed to be 15.43 mm, 17.21 mm, 17.51 mm and 18.51 mm, while in males it was 16.41 mm, 19.24 mm, 19.86 mm and 20.35 mm respectively. The mean value of Torg's ratio at third, fourth, fifth and sixth cervical vertebral level in females was observed to be 1.10, 0.97, 0.97 and 0.94, while in males it was 1.17, 0.95, 0.93 and 0.94 respectively.

**Discussion :**

The mean value (in mm) of anteroposterior diameter of cervical vertebral canal was measured by different authors as follows –

S. No.		C3	C4	C5	C6
1.	Augustin M. [3] (in Brazilian male soldiers)	18.22	17.98	18.33	18.76
3.	Payne and Spillane[1] (in males)	18.8	17.6	17.8	17.8
4.	Torg J. S. [2] (in adult males of New York)	19.24	18.56	18.71	19.03
5.	Kim K. Y. [4] (in normal Korean adults)	17.14	16.41	16.79	17.39
6.	Sasaki T. [5] (in normal adult Japanese)	15.8	15.2	15.3	15.7
7.	Present study (in males)	18.46	18.33	18.56	19.10

The anteroposterior diameter of cervical vertebral canal has been noted to be smallest (on an average 15 mm) in Japanese males and largest (on an average 19 mm) in the adult males of New York. In present study it measures 17.60 mm (average).

Values of Torg's ratio measured by different authors and in present study are shown in the table below –

S. No.		C3	C4	C5	C6
1.	Chen I. H. [6] (in Chinese males)	0.94	0.95	0.97	0.97
2.	Torg J. S. [2] (in adult males of New York)	1.00	0.97	0.97	0.97
3.	Indian males of Delhi[7]	0.99	0.97	0.96	0.96
4.	Present study (in males)	1.17	0.95	0.93	0.94

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