



## **Morphometric Analysis Based On Length Of Vertebral Column In Different Age Group Of Indian Human Foetuses**

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### ***Abstract:***

- *Introduction : Foetal vertebral column seemed to be the focus of interest by many scientists but its morphometric information received little attention only in other animals, even though important for human clinical applications. Morphometric readings of human foetal vertebral column will help in determining the age of foetuses, which may be of great medicolegal significance.*
- *Material and Methods: Foetuses without any congenital cranio-vertebral anomalies were selected for the study and divided into five groups on the basis of gestational age. Laminectomy was performed and the spinal cords from human foetuses were taken out for the proper visualization of vertebral column from behind. Length of vertebral column was measured directly by Vernier calipers under standard conditions.*
- *Result & Conclusion: Significant increment in length of human foetal vertebral column was observed in successive adjacent groups from group II onwards. There was maximum increment in length of vertebral column between groups II and III human foetuses.*
- **Key words:** *vertebral column, length, human foetus, morphometry*

## 1.Introduction

Foetal anatomy has become very special now a days due to application of surgery before birth for the treatment of lethal disorder [1]. Foetal vertebral column seemed to be the focus of interest by many scientists but its morphometric information received little attention only in other animals ,even though important for human clinical applications. . Morphometric readings of human foetal vertebral column will help in determining the age of foetuses, which may be of great medicolegal significance. This study will provide accurate data related to the length of vertebral column of Indian human foetuses which is lacking in literature till now.

## 2.Material And Methods

Foetuses without any congenital cranio-vertebral anomalies were selected for this study. The parameters used for determination of gestational age was foetal foot length. Fair correlation between foot length and gestational age was documented [2]. For the purpose of analysis and evaluation, foetuses were divided into 5 groups as follows.

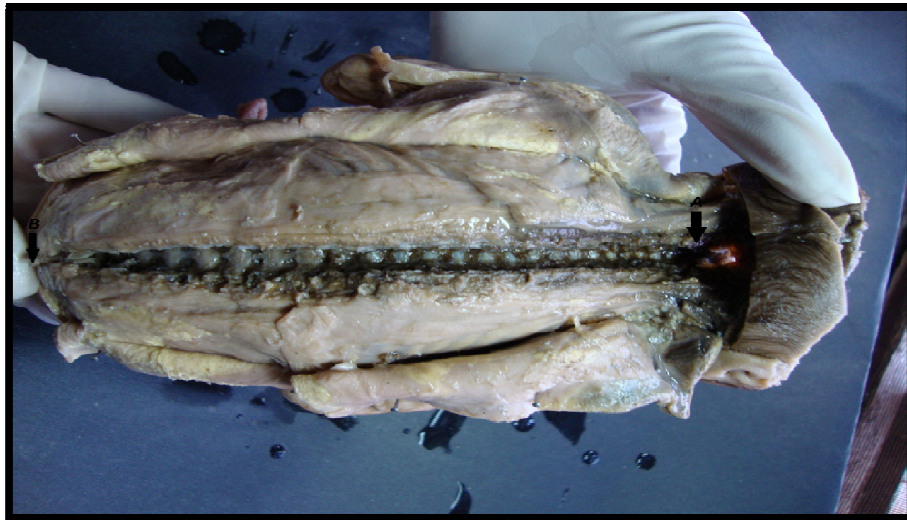
Groups	Age (wks)	No. of Males	No. of Females	Total
I	< 17	3	3	6
II	17-20	3	3	6
III	21-25	3	3	6
IV	26-30	3	3	6
V	> 30	3	3	6

*Table 1*

Laminectomy was performed to open vertebral canal from behind. The method was popularly used by surgeons to approach structures inside the canal [3].

- Vertebral canal was exposed by laminectomy performed by putting the scissor in sacral hiatus on either side and continuing it upwards (Fig. 1).
- Spinal cord with its meningeal coverings were cleaned by removing soft tissue in vicinity.

- A vertical cut was made in dura mater along with arachnoid mater, starting in the lumbar region and continuing upto foramen magnum .
- Spinal cord was exposed by reflecting dura, arachnoid together laterally from aforementioned midline incision .
- All the nerve roots were cut on both sides.
- The spinal cord was removed after making cross section in it at the level of the upper border of atlas vertebra .
- Length of the vertebral column from the upper border of atlas vertebra to tip of coccyx. was recorded by Vernier calipers under standard conditions.
- For Statistical analysis findings were analysed by using Student's 't' test.



*Figure 1*

Vertebral column seen from behind after total laminectomy.

A- Upper end of posterior end of arch of atlas; B- Tip of coccyx

**3.Result**

<b>Groups</b>	<b>No. of Foetuses</b>	<b>Mean <math>\pm</math> S.D.</b>	<b>Per cent change</b>	<b>T value</b>	<b>P value</b>
I	6	79.50 $\pm$ 10.83	–	–	–
II	6	86.80 $\pm$ 9.82	+9	0.248	Insignifica nt
III	6	129 $\pm$ 3.09	+48	1.55	Significant *
IV	6	153.66 $\pm$ 6.47	+19	7.48	Significant *
V	6	183.83 $\pm$ 6.04	+19	8.13	Significant *

*Table 2: Length of vertebral column (mm)*

*\*P value < 0.001*

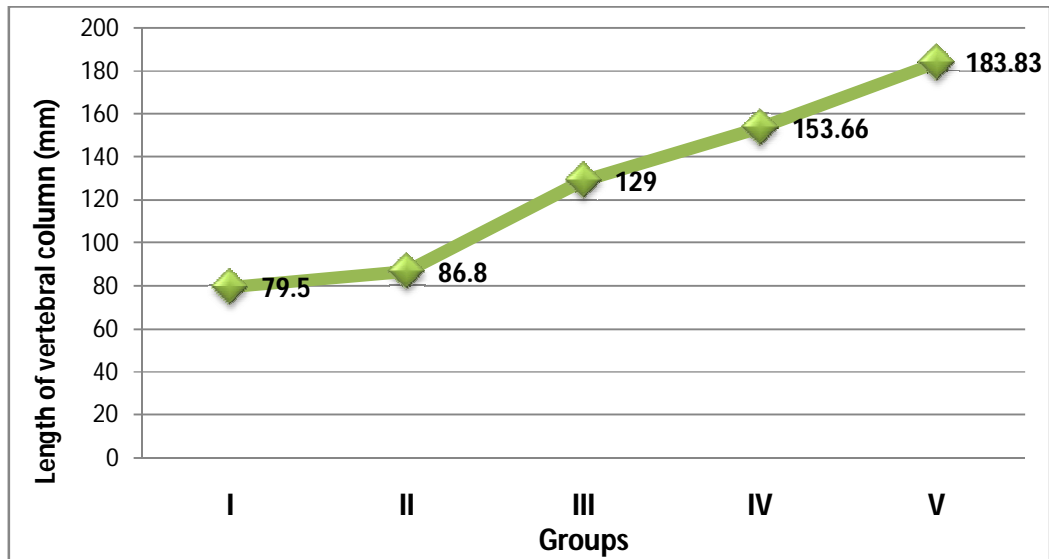


Figure 2

Graph showing pattern in length of vertebral column with gestational age.

#### 4. Discussion

Hifny et al (1984) depicted relation between vertebral column and spinal cord in *Equus asinus* [4]. Wallny et al (2002), showed correlation of size of spinal canal and spinal length with gestational age using 3-D ultrasonography [5]. Length of vertebral canal was also measured by Ghazi et al but in foetuses of sheep and compared with spinal cord length [6]. Cyzyz and Kedzia (2004), studied on geometrical assessment of human foetal lumbar vertebral column and concluded that posterior element of lumbar vertebrae underwent a process of transformation during foetal period [7].

Length of vertebral column increased from minimum value of 79.5 mm in group I to maximum value of 183.83 mm in group V. Change from group I to group II was insignificant statistically. There was highly significant change in measurements between group II and group III, group III and group IV, group IV and group V.

#### 5. Conclusion

Our study proves that the maximum increment in the length of human foetal vertebral column occurred between group II and group III foetuses. Maximum increment in the length of vertebral column of the Indian human foetuses takes place from 17 to 25 week of gestational age.

- Conflict of Interest: None declared

**5.Reference**

1. Michael TL, Mitchell SG, et al. Maternal outcome after open surgery. *JAMA* 1991; 265 : 737-741.
2. Streeter G. L. (1920): “Weight, sitting height, head size, foot length, and menstrual age for the human embryo”, *Contrib Embryol.* 11:143
3. Fu YS, Zeng BF, et al. Long-term Outcomes of Two Different Decompressive Techniques for Lumbar Spinal Stenosis. *Spine* 2007; 33 (5): 514–518.
4. Hifny A, Ahmed AK, Amnsour AA. The relation between the vertebral column and spinal cord in *Equus asinus*. *Assiut Veterinary Medical Journal* 1984 ; 12 : 3-6.
5. Wallny T, Schild RL, et al. Three-dimensional sonographic evaluation of the foetal lumbar spinal canal. *J Anat* 2002; 200(5): 439-443.
6. Ghazi SR, Gholami S. Allometric growth of the spinal cord in relation to the vertebral column during prenatal and postnatal life in the sheep. *J Anat* 1994 ; 185 : 427-431.
7. Cyzyz M, Kedzia A. Geometrical assessment of the foetal lumbar vertebral column-clinical implications. *Via Medica* 2004; 63(4) : 431-438.