

Variation in the Weight of Spinal Cord in Different Age Group of Indian Human Foetuses

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Abstract- Introduction: Morphometric measurements including the weight of foetal spinal cord is helpful in determining the age and sex of foetuses, which are of great medicolegal significance. The aim of present study is to obtain accurate measurements of weight of human foetal spinal cord in different age groups.

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 and weight recorded on electronic weighing machine under standard conditions.

Result & Conclusion: Significant gain in weight of foetal spinal cord was observed in successive adjacent groups from group II onwards and maximum gain in weight was observed between group III and IV.

Index Terms- morphometry, human foetus, spinal cord, weight.

I. INTRODUCTION

Out of various subdivisions, embryology gets unique place because birth defects are a leading cause of infant mortality and a major contributor to disabilities, so understanding the principles of embryology is important for health care professionals [1].

Foetal spinal cord seemed to be the focus of interest by many scientists but its morphometric information received little attention, though important for clinical applications. Morphometric readings including the weight of foetal spinal cord are helpful in determining the age of foetuses, which are of great medico legal significance.

The aim of present study is to obtain accurate measurements of weight of spinal cord in Indian human foetuses in different age groups as the present data is lacking in the literature.

II. 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.

Table -1

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

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

1. Vertebral canal was exposed by laminectomy performed by putting the scissor in sacral hiatus on either side and continuing it upwards (Fig. 1).
2. Spinal cord with its meningeal coverings were cleaned by removing soft tissue in vicinity.
3. A vertical cut was made in dura mater along with arachnoid mater, starting in the lumbar region and continuing upto foramen magnum .
4. Spinal cord was exposed by reflecting dura, arachnoid together laterally from aforementioned midline incision .
5. All the nerve roots were cut on both sides.
6. The spinal cord was removed after making cross section in it at the level of the upper border of atlas vertebra .
7. Weights were recorded on electronic weighing machine under standard conditions.
8. For Statistical analysis findings were analysed by using Student's 't' test.

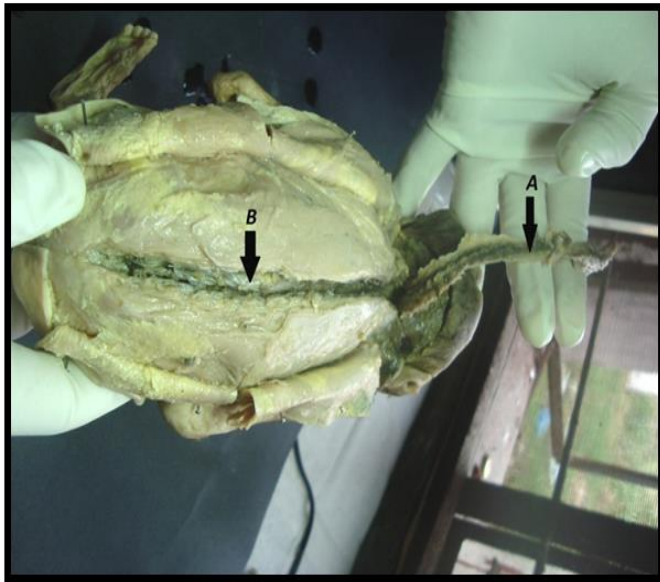


Figure –1

Dorsal aspect of human foetus showing total laminectomy (A) to expose spinal cord along with its meninges (B) in the vertebral canal.



Figure-2

Human foetal spinal cord

III. RESULTS

Table 2: Weight of spinal cord (g)

Groups	No. of Foetuses	Mean ± S.D.	Per cent change	T value	P value
I	6	0.16 ± 0.01	–	–	–
II	6	0.18 ± 0.01	+13	0.01	Insignificant
III	6	0.69 ± 0.04	+28	2.33	Significant*
IV	6	1.07 ± 0.01	+56	3.10	Significant*
V	6	1.40 ± 0.02	+31	5.42	Significant*

*P value < 0.00

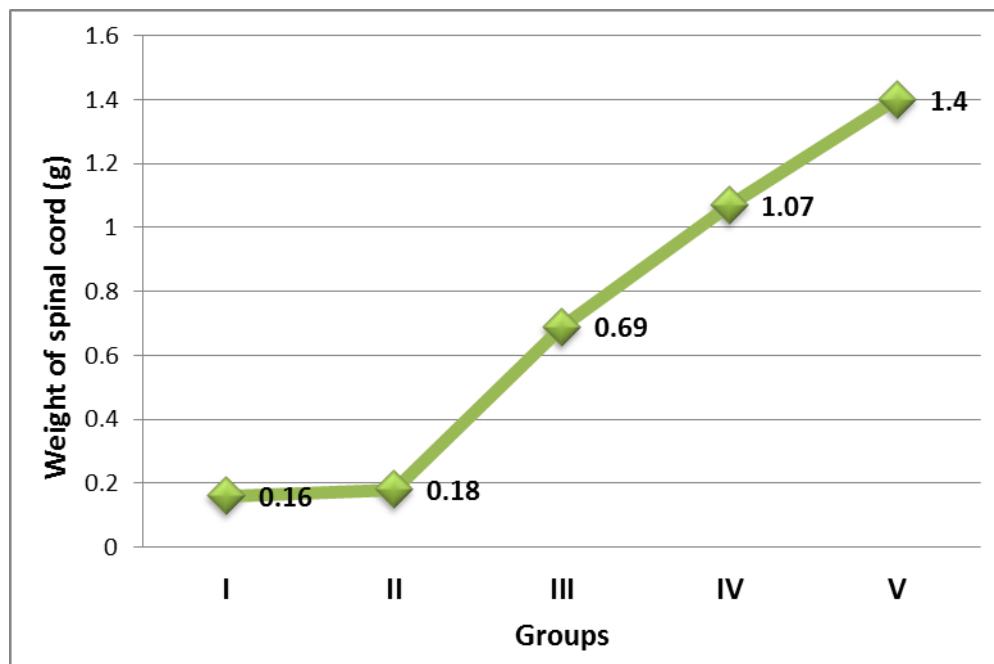


Figure – 3

Graph showing pattern in weight of spinal cord with gestational age.

IV. DISCUSSION

The descriptions of spinal cord found in literature were based mainly on specimens derived from adults [4, 5, 6]. Some of the scientists made attempts to assess the morphometry of foetal spinal cord but the basis of such information were ultrasonography and magnetic resonance imaging techniques and that too of only a portion of human foetal spinal cord [7, 8, 9]. Thus the detailed analysis of weight of whole human foetal spinal cord by direct dissection and observations in our study was first of its kind.

Weight of spinal cord increased from 0.16g in group I to 0.18 g in group II, but this change was insignificant. After that, change was significant between groups II and III. Significant changes also occurred between groups III and IV and groups IV and V. Finally weight reached 1.40 g in group V.

V. CONCLUSION

In our investigations, we found significant gain in weight of spinal cord (Table- 2) in the foetuses with increasing gestational age. In group I, mean weight of spinal cord was 0.16g which increased to 0.18g in group II but this change was statistically insignificant. Then afterwards there was significant increase in weight of spinal cord in subsequent groups. The growth was maximum (283%) between foetal group II and III.

Our study establishes that the maximum gain in the weight of human foetal spinal cord occurs during 17 to 25 week of gestational age. The significance of the maximum gain in weight of spinal cord during 17 to 25 weeks of gestation is not known but this study can be further extended to know the correlation (if any) of the sex of human foetus with the maximum gain in weight.

Conflict of Interest: None declared

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