

Original Research Article



**CORRELATION OF BRANCHING PATTERN OF  
CHORIONIC BLOOD VESSELS TO BIRTH WEIGHT OF NEW  
BORN IN FULL TERM PREGNANCY**

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**ABSTRACT**

**Background:-** Chorionic vessels present on placental surface show two types of branching pattern, the dispersal type where the blood vessels undergo successive divisions with gradually diminishing caliber towards periphery and the magistral type where vessels give small branches without marked reduction of caliber. The present study was conducted to correlate the branching pattern of chorionic blood vessels to birth weight of new born in full term pregnancy.

**Material and Methods:-** This study was conducted on 200 full term placentae obtained from Department of Obs. & Gyane., Rajarshi Dashrath Autonomous State Medical College, Ayodhya. To observe the different branching pattern of chorionic blood vessels, dye injected method was used. The birth weight of new-born baby was also noted by digital baby weighing scale.

**Results and Discussion –** In chorionic blood vessels the dispersal type (54%) of branching pattern was predominant over magistral (46%) and mean birth weight in dispersal type was  $2.55 \pm 0.33$  kg & in magistral type it was  $3.15 \pm 0.45$ kg respectively.

**Conclusion:-** It was concluded that branching pattern of chorionic vessels directly affect birth weight of new born.

**Key words:-** Placenta, Chorionic vessels, Dispersal & Magistral pattern, Birth weight

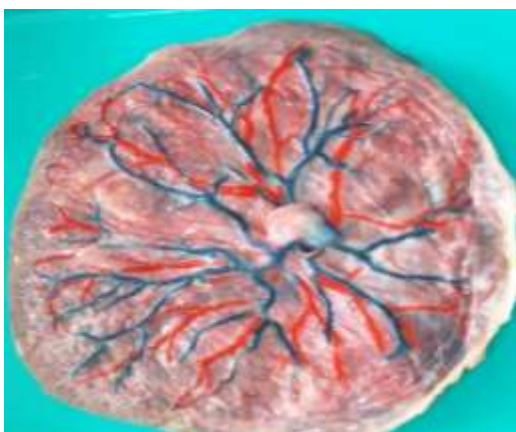
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## **INTRODUCTION**

Placenta is a foetomaternal organ composed of maternal part, decidua basalis & a fetal part, chorion frondosum [1,2,3]. It plays a crucial role in foetal development & health by carrying the important vital functions & activities such as respiration, nutrition, excretion & hormone production etc [4,5,6]. Foetal growth & well-being directly depends on the functional & structural component of the placenta [1]. Foetal surface of placenta is covered with smooth shiny delicate membrane called as amnion[7,8]. The branches of umbilical vessels runs between the two layers of amnion called as chorionic vessels [9]. Chorionic vessels present on placental surface show two types of branching pattern[10,11]

**A. Dispersal type:-** In the dispersal type, the chorionic vessels undergo successive division with gradually diminishing caliber towards periphery. (**Fig - A**)

**B. Magistral type:-** In the magistral type, the chorionic vessels give small branches without marked reduction of caliber towards periphery. (**Fig - B**)



**(Fig - A)**



**(Fig - B)**

### **MATERIAL & METHOD**

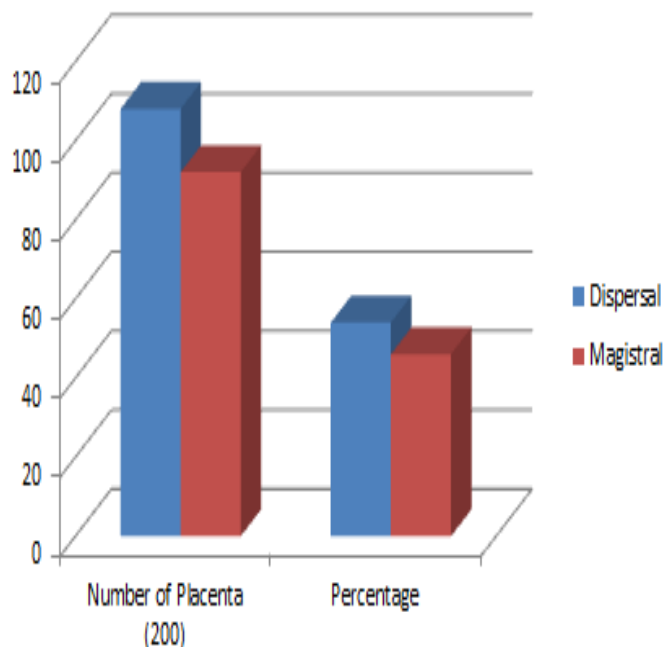
This cross sectional observational study was conducted in the Department of Anatomy, Rajarshi Dashrath Autonomous State Medical College, Ayodhya in collaboration of Department of Anatomy, Integral Institute of Medical Sciences & Research, Integral University, Lucknow. A total of 200 fresh intact placenta of full term pregnancy collected from Department of Obs. & Gynae., Rajarshi Dashrath Autonomous State Medical College, Ayodhya after gaining consent from patient. The birth weight of newborn baby was also noted.

After cleaning & washing the placenta, removal of blood clots done by squeezing method (applying digital pressure over chorionic vessels) followed by irrigation with normal saline. At the cut end of the umbilical cord, dyes were injected into umbilical vein (eosin) & arteries (methylene blue). Each vessel will be followed & observed to know the type of branching pattern of chorionic blood vessels of placenta.

### **OBSERVATION & RESULT**

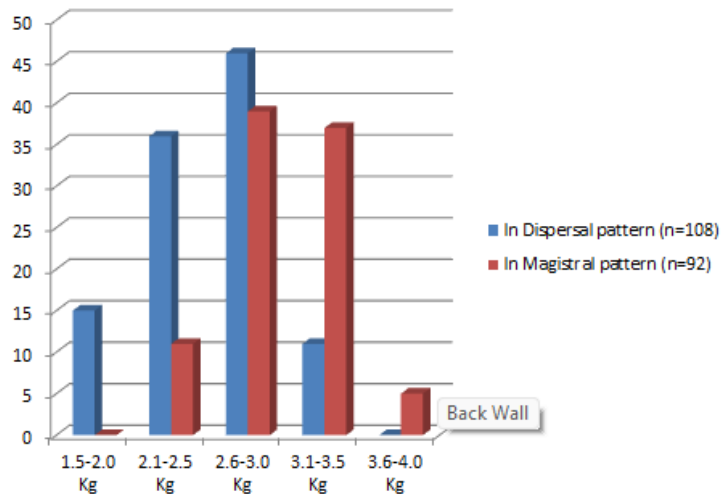
#### **Branching Pattern of chorionic vessels**

Type of Branching Pattern	Number of Placenta (200)	Percentage (%)
Dispersal	108	54%
Magistral	92	46%



**Weight of newborn babies with branching pattern**

Range of Birth weight of newborn babies	In Dispersal pattern (n=108)	In Magistral pattern (n=92)
1.5-2.0 Kg	15	00
2.1-2.5 Kg	36	11
2.6-3.0 Kg	46	39
3.1-3.5 Kg	11	37
3.6-4.0 Kg	00	05



**Correlation of Branching pattern with Birth weight**

Type of Branching Pattern	Weight of Newborn Babies		Mean Birth weight
	Minimum (Kg)	Maximum (Kg)	
<b>Dispersal (n =108)</b>	<b>1.7</b>	<b>3.4</b>	<b>2.55±0.33 kg</b>
<b>Magistral (n=92)</b>	<b>2.4</b>	<b>3.9</b>	<b>3.15±0.45 kg</b>

**DISCUSSION & CONCLUSION**

Placenta via umbilical cord (consisting of two umbilical arteries and one umbilical vein) form a transport system for substances passing between mother and embryo / foetus [12,13]. Mature placenta and foetal membranes perform various functions included safety of foetus, nourishment, gaseous exchange, elimination of metabolic wastes as well as endocrine functions etc. [13,14]. In the beginning the arrangement of chorionic vessels was described as like that of spokes of wheel [11,12]. According to **Schordania J. et al** branching pattern of chorionic vessels is not a haphazard phenomenon, but it is genetically determined by vascular characteristics of mother & described as the dispersal and magistral type [1].

In present study branching pattern of chorionic blood vessels follow dispersal (54%) and magistral (46%) pattern respectively. It was also observed in present study that there is clear indication of relationship between the branching pattern and birth weight of the newborn. It is lower ( $2.55 \pm 0.33$  kg with a range of 1.7kg to 3.4kg) in dispersal pattern in comparison to magistral pattern ( $3.15 \pm 0.45$  kg with a range of 2.4 kg to 3.9kg). In another study by **Bhargava et al, Shordania and Bacsich et al** it was observed that there is significant relationship between branching pattern of chorionic vessels and weight of the newborn [1, 2, 5]. Similar to them we also found clear indication of relation between branching pattern of chorionic vessels and weight of newborn. In a study by **Verma et al** it was observed that there was significant relationship between the vascular pattern and birth weight of the neonate which was higher in magistral pattern in comparison to dispersal pattern in both the sexes [9]. In same to their study we found higher birth weight in newborn with magistral pattern of placenta as compare to that of dispersal pattern. This can be explained as in magistral pattern, chorionic vessels divide without reduction of their caliber from central to peripheral region so more flow & better chance for even distribution of blood throughout the substance of placenta and the foetus might be getting better nourishment and oxygen for the growth & get more birth weight [9].

Present study gives knowledge about correlation between branching pattern of chorionic blood vessels and birth weight of newborn baby. In magistral pattern birth weight of newborn babies have higher range (2.4 kg to 3.9 kg) than the dispersal pattern which clearly indicates that in cases of placenta with magistral branching pattern, there is always more growth & good development of foetus & less chances of IUGR (Intra-uterine growth restriction).

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#### **CONFLICT OF INTEREST**

The authors have no conflicts of interest to declare.

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#### **REFERENCES**

1. Schordania, J. Uber das Gefasssystem der Nabelschnur. Anat. U. Entwicklgsch. 1929; 89; 696-726.
2. Bacsich P & Smout CFV. Some observation on the fetal vessels of human placenta, with an account of the corrosion technique. J. Anat. 1938; 72: 358-64.
3. Crawford JM. Vascular anatomy of human placenta. Am. J. Obs. Gynae. 1962; 54; 1543-1567.
4. Smart P J. Some observations on the vascular morphology of the foetal side of the human placenta. J. Obstet. Gynaecol. Br. Emp., 69:929-33, 1962.
5. Bhargava I & Raja PTK. An anatomical study of the foetal blood vessels on the chorial surface of human placenta. Acta. Anat. (Basel) 1970; 75(I); 13-26.

6. Cunnigham FG, Gant NF, Leveno KJ, Gilstrap LC, Hauth JC & Wenstrom KD. Physiology of Pregnancy, Placenta& Fetal membranes. Williams Obstetrics 21<sup>st</sup> ed. Newyork, McGraw Hill Inc. 2001; 109-128.
7. Moore KL & Persaud V. Placenta and fetal membrane; The Developing Human-clinical oriented anatomy, 8<sup>th</sup> ed.; India; Saunders-Elsevier; 2008; 111-144.
8. Sadler TW. Third month to birth: The fetus and placenta; Langman's medical embryology, 12<sup>th</sup> ed. Philadelphia; Lippincott; 2012; 96-115.
9. Verma R, Prasad R, Mishra S & Kaul JM. Vascular pattern of chorionic blood vessels of placenta and its correlation with the birth weight of neonate. Int. J. Morphol., 2012, 30(3):952-955.
10. Veerabhadrapa HC. Study of the vascular organization of the placenta, Int. J. Health Sci. Res. 2013; 3(4); 32-35.
11. Sarwar MY, Kumar N & Pandey NK. Observations on vascular pattern of chorionic blood vessels of placenta, J. Evol. Medi. and Dent. Sci. 2013; 2(44); 8650-8654.
12. Patel J, Patel B, Dave R, Ram S, Bhojak N & Desai J. A study of placental vascular pattern by corrosive cast in Gujarat region, NJIRM; 2014; 5(1); 64-71.
13. Gupta A, Mahla V, Kulshreshtha V, Garg S & Singh R. Study of arterial pattern & its correlation with the shape of human placenta by corrosion cast method, Ind. J. Clini. Anat. & Physio. 2016; 3(1); 50-54
14. Soni S, Bhardwaj K, Garg S & Mishra S.K. Study of arterial pattern of normal human placenta in reference to its shape, weight and Hyrtl's Anastomosis. Int J Med Res Rev 2017;5(05):455- 461.