

# Morphological Study of Human Placenta in Normal and Hypertensive Pregnancy

K.M.Parmar<sup>1</sup>, Hetal Vaishnani<sup>2</sup>, G.V.Shah<sup>3</sup>

<sup>1</sup>Assistant Professor, Department of Anatomy, Smt. B.K. Shah Medical institute & Research Centre, Sumandeep Vidyapeeth, Piparia, Vadodara, Gujarat,

<sup>2</sup>Associate Professor, Department of Anatomy, Smt. B.K. Shah Medical institute & Research Centre, Sumandeep Vidyapeeth, Piparia, Vadodara, Gujarat,

<sup>3</sup>Dean, Department of Anatomy, Smt. B.K. Shah Medical institute & Research Centre, Sumandeep Vidyapeeth, Piparia, Vadodara, Gujarat.

## Abstract

**Introduction:** The normal human placenta is a dynamic discoid organ have two surfaces; 1. The chorionic plate facing the foetus (the umbilical cord attached) and 2. The basal plate which about the maternal endometrium. Human placenta has drawn attention as valuable information regarding foetal & maternal diseases. As placenta guide the intra uterine status of the foetus, study of the placenta will give an accurate condition of the foetal outcome. The aim of this study was to study the morphology of placenta with normal & hypertensive mother. **Subjects and Methods:** This present study was carried out in the Dept. of Anatomy, Smt. B. K. Shah Medical institute & Research Centre, in association with the dept. of OB & GY of Dhiraj hospital, Piparia, Waghodia, Vadodara district. A total number of 100 (Hundred) placenta (50 - fifty hypertensive mother + 50 - fifty normal mother) with 5cms length of umbilical cord were collected from the Obstetric dept. and relevant medical history (H/O) related of the mother were noted and recorded from the data available in the hospital record section. **Results and Conclusion:** In this present study group comprised human placentae from fifty (50) pregnancies with hypertensive mother. The control group comprised fifty (50) human placentae from pregnant mothers with normal blood pressure, without proteinuria and without edema. Among study group most common pregnancy comprised pre-eclampsia (50%) in this study. The mean age of hypertensive mothers were  $25.9 \pm 2.5$  years in this present study. The mean age of non-hypertensive mother were  $25.1 \pm 3.21$  in this present study.

**Keywords:** Placenta, hypertension, pregnancy, Morphology

**Corresponding Author:** Dr. Hetal Vaishnani, Associate Professor, Department of Anatomy, Smt. B.K. Shah Medical institute & Research Centre, Sumandeep Vidyapeeth, Piparia, PIN : 391760, Vadodara, Gujarat.

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## Introduction

The human placenta is a dynamic discoid organ which has two surfaces; one the chorionic plate facing the foetus (umbilical cord attached) & the basal plate which about the maternal endometrium (Wang et al., 2004; Sørensen et al., 2013.<sup>[1,2]</sup>

It is the only organ in the body from two separate individuals, first from mother and second from the foetus and is the primary metabolic regulator for the respiratory system, excretory function, nutritional deficiency, endocrine and immunological functions of the foetus necessary for the foetal growth, Raghunath & Vijayalakshmi et al .2011; Singal et al., 2013.<sup>[3,4]</sup>

The normal human placenta at term pregnancy has a dark blue red colour / maroon colour and weighs about 590 grams and is appx. 20 to 25 cm in diameter and 3 cm thick, Tissot van Patot et al., 2009; Heazell et al., 2010.<sup>[5,6]</sup> These morphological measurements can vary considerably due to many factors including pathological and physiological factors, Janthanaphan et al., 2006; Kaplan, 2008.<sup>[7,8]</sup> The normal weight of the placenta has been varied over the

years but recent studies show that it has an average weight of about 590 grams with a range of 350 to 750 grams Panti et al., 2012; Lakshmi et al., 2013.<sup>[9,10]</sup> It has been shown that placental weight has a significant role in foetal growth in terms of weight, body length, and cord length but it has no significant role in the presence of meconium - stained fluid Lo et al., 2002.<sup>[11]</sup> Little et al. (2003) reported that absolute measures of infant size and placental weight had mutual positive correlation.<sup>[12]</sup>

Placenta drawn attention towards valuable information related to foetal & maternal diseases.<sup>[13]</sup>

Eskild A,Vatten LJ, many disorders related to pregnancy which are associated with high risk peri natal morbidity & mortality , shown gross pathological changes in human placenta. Many maternal diseases and disorders bring about to notice for changes in placenta at morphological and microscopic level. Abnormal results of placenta adversely affects the fetal outcome.<sup>[14]</sup>

Udaina.A & Majumdar S, as placenta is the mirror of maternal and foetal outcome, complications in pregnancy has been reflected in the placenta in a significant way both macroscopically & microscopically.<sup>[15-18]</sup>

As placenta guide the condition of intra uterine status of the foetus, study of the placenta give an accurate outcome of the foetal condition (Manik Sirpurkar et al).<sup>[19]</sup>

Benirschke. K & Carolyn M, life threatening complications of human pregnancy like gestational diabetes, iron deficiency anaemia, hypertension & intra uterine growth retardation (IUGR) result in both macroscopic as well as microscopic changes in the placenta.<sup>[20,21]</sup>

Maternal hypertension, a global epidemic in 21 st century pregnancy complication & became one among the deadly triad along with hemorrhage and infection in pregnancy resulting in large number of maternal deaths and there off fetal deaths. Choe Jing Jye, PIH (Pregnancy induce Hypertension) is a pregnancy specific, multi-systemic disorder characterized by hypertension, edema and proteinuria after twenty weeks (20 weeks) of gestation.<sup>[22]</sup>

Emery SP, pregnancy complicated by hypertension is commonly associated with placental insufficiency.<sup>[23]</sup> Bewly S, has recorded that maternal utero-placental blood flow is reduced in pre-eclampsia because there is maternal vasospasm.<sup>[24]</sup> Hypoxia in inter-villous space due to reduction of blood flow in placenta & myometrium is involved in the mechanisms of morphological alterations of the placenta because of maternal hypertension (Alvarez H et al).<sup>[25]</sup>

The feature of abnormal placentation in PIH (Pregnancy induce hypertension) is inadequate trophoblastic invasion of maternal spiral arteries that results in persistence of muscular & elastic tissues in tunica media. Blood vessels fail to dilate, remain responsive to vasomotor influences that lead to high resistance low flow chorio-decidual circulation.<sup>[26]</sup> This results in morphological & histological changes in ischemic placentae and fetal hypoxia leading to intra uterine growth retardation (IUGR) which contributes to premature delivery & fetal death (Zhou Y et al).<sup>[27]</sup>

### Subjects and Methods

This present study was conducted in the dept. of anatomy, Smt. B.K. Shah Medical institute & Research Centre with dept. of OB & GY of Dhiraj hospital, Piparia, Waghodia Vadodara.

A total no. of 100 (Hundred) placenta (50- Fifty hypertensive mother + 50- fifty normal mother) with Five (5) cms length of umbilical cord of studied subjects were collected from the Obstetrics dept. & relevant medical history of the mother were noted from the data available in the Hospital record section.

The studied specimens of placenta and cord were brought to the dept. of anatomy. The placenta and cord washed with water to remove the blood clots & make them dry.

The following data were recorded for the study (Weight,

Consistency, Shape Cord attachment, Thickness of placenta is measured by inserting the fine needle through & through and measured upto nearest millimeters, Diameter of the placenta is measured by taking as average of the diameter with measuring tape). There were present or absent (hematoma, calcification, infarction) noted.

This study comprised 1. Study group: fifty (50) placentae from pregnancies with hypertension (PIH). Those pregnant women who had blood pressure at or above 140/90 mmhg. Involved in hypertensive group. 2. Control group comprised fifty placentae from pregnant women with normal blood pressure.

### Results

In present study hypertensive mother group (study group), maximum number of placentae were from the Pre eclamptic mothers.

**Table 1: Distribution of study group**

Type of Pregnancy	No. of Cases	Percentage (%)
Gestational Hypertension	13	26 %
Pre-eclampsia	25	50%
Eclampsia	12	24%
Total	50	100%

The study group comprised placentae from fifty pregnancies with hypertension. The control group comprised fifty placentae from pregnant mothers with normal blood pressure, without proteinuria and without edema. Among study group most common pregnancy comprised pre-eclampsia (50%).

**Table 2: Comparison according to maternal age.**

Age Group (Years)	Hypertensive (Study)	Normal (Control)
20-24	16	12
25-29	24	30
30-35	10	08
Total	50	50
Mean ± SD	25.9 ± 2.5	25.1 ± 3.21

The mean age of hypertensive mothers was 25.9 ± 2.5 years. The mean age of non-hypertensive mother was 25.1 ± 3.21.

**Table 3: Distribution related to parity.**

Partiy	Hypertensive Mothers	Normal mothers	Total
Primi	40	38	78
Multi	10	12	22
Total	50	50	100

Above table suggest maximum no of hypertensive mothers were primi para and also maximum no in normal mothers. There was no significant difference between this two groups.

**Table 4: Comparison of pregnancy outcome**

No	Pregnancy outcome		Hypertensive mothers		Non hypertensive mothers		Significance
			No	%	No	%	
1	Mode of delivery	Vaginal	28	56%	36	72%	p < 0.001
		LSCS	22	44%	14	28%	
2	Term of baby	Pre Term	19	38%	01	02%	P<0.01
		Term	31	62%	49	98%	
3	Type of birth	Live	45	90%	50	100%	P<0.001
		IUD	05	10%	00	00	

**Table 5: Gross morphology of Placenta**

No	Features of Placenta	Component	Hypertensive		Non hypertensive		Significance
			No	%	No	%	
1	Shape	Discoid	29	58%	49	98%	P < 0.01
		Irregular	21	42%	01	02%	
2	Hematoma	Absent	42	82%	50	100%	P < 0.05
		Present	08	16%	00	0	
3	Infarction	Absent	40	80%	48	96%	P < 0.001
		Present	10	20%	02	04%	
4	Calcification	Absent	27	54%	42	84%	P < 0.01
		Present	23	46%	08	16%	

The above table suggest that, hypertensive mothers delivered 56 % vaginal, 44 % LSCS and non-hypertensive mothers delivered 72 % vaginal, 28 % LSCS. In hypertensive mother's 38 % pre term and 62 % Term baby and in non-hypertensive mothers 02 % pre term and 98 % term baby. In hypertensive mothers 90 % live birth and 10 % intra uterine death and in non-hypertensive mothers 100 % live birth.

The above table suggest that placenta of hypertensive mother were 58 % discoid in shape and non-hypertensive were 98 % discoid in shape. In hypertensive mother hematoma present in 16 % and in non-hypertensive hematoma were absent. In hypertensive mother infarction were present in 80 % cases and in non-hypertensive present in 2 % cases. In hypertensive mother calcification present in 46 % and in non-hypertensive present in 16 % cases.

**Table 6: Other placental finding**

Variable placental feature	Hypertensive (No.50 Cases)		Non hypertensive (No.50 Cases)	
	Mean	SD	Mean	SD
Placenta weight	470.38	± 60.21	506	± 24.32
Placenta diameter	18.20	± 0.82	19.6	± 0.78
Placenta thickness	2.04	± 0.61	2.38	± 0.21
Cotyledon	16.82	± 3.04	18.5	± 2.15
Foeto placental ratio	5.81	± 0.2	5.7	± 0.61
Placental Area	208.6	± 10.54	216.9	± 0.40

## Discussion & Conclusion

The present study was conducted in the department of Anatomy, Shree B.K. Shah Medical institute & Research Centre, in collaboration with the Department of Obstetrics and Gynecology of Dhiraj hospital, Piparia, Vadodara. A total number of 100 placenta(Fifty hypertensive mother + fifty normal mother) with 5cms length of umbilical cord were collected from the Obstetrics department and relevant medical history of the mother were noted from the data available in the Hospital records.

Pregnancy induced hypertension adversely affects the morphology of placenta. Placenta brings the mother and fetus, the two important ends of reproduction in contact with each other. Therefore the placenta which is usually considered as records of infant's prenatal experience provides crucial information about the deleterious effects of pregnancy induced hypertension on fetal outcome.

Teenage pregnancy and primi gravida were risk factors for preeclampsia and eclampsia the prevalence of pre-eclampsia (50%) and eclampsia (24%) in this study [Table 1] Shiva shree ranga et al found similar finding of hypertensive pregnancies.

The prevalence of infarction of placenta of hypertensive

mother were 20 % and in non-hypertensive mother were 02%.

Udaina et al and Majumdar and Correa et al found similar finding in their studies.

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