



## A COMPARATIVE MORPHOMETRIC STUDY OF HUMAN PLACENTAE OBTAINED FROM MOTHERS WITH PIH AND MOTHERS WITH NORMAL BLOOD PRESSURE

### Anatomy

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### ABSTRACT

**Introduction-** Placenta is a marker for the growth & development of the foetus in uterus. A thorough examination of the placenta in-utero, as well as post partum, gives valuable information about the state of foetal well being. **Objectives -** The present study was performed to evaluate the morphological changes in placenta obtained from patients with history of pregnancy induced hypertension (PIH) and compare them with placenta obtained from patients who had normal blood pressure in pregnancy as in the developing countries, pregnancy induced hypertension is well recognized obstetrics hazard.

**Material & method -** 100 placentae were obtained from the labour room and operating theatres of Rama Hospital & Research centre, Hapur. 50 placentae were from patients who had pregnancy induced hypertension (study group) and 50 were from normotensive pregnant women (control group). Detail history of each mother along with measurement of blood pressure was recorded. Weight of each baby was recorded at the time of birth. Then gross examination of placenta including weight, shape, cord insertion, thickness were noted in both groups.

**Result -** On morphometric examination, it was noted that the placenta obtained from study group were smaller and irregular with mean weight up to 20% less than the placenta of control group. There was marginal insertion of cord in 74% of placenta of study group as compared to only 26% in control group. On gross examination, foci of calcification, infarction and thrombosis were seen almost twice the number of placenta from study group as compared to control group. The difference in gross examination of placenta was more significant if the patients had hypertension  $\geq$  140/100 mm Hg. This also correlated with the birth weight of babies born. The mean weight of babies born to hypertensive mothers was 1.97 kg while it was 2.68 kg in normotensive mothers.

**Conclusion-** This study has shown that in moderate to severe hypertension there are number of morphometric changes in the placenta which may be helpful to clinicians in management of complications associated with it.

### KEYWORDS

Pregnancy induced Hypertension (PIH), Weight of fetus, Placental weight, umbilical cord

### INTRODUCTION

Placenta is a leading cause of maternal and perinatal mortality and an important factor in fetal growth retardation<sup>1</sup>. Survival and growth of foetus is essentially dependent on formation, full development and functions of the placenta. It undergoes different changes in weight, volume, structure, shape and function continuously throughout the gestation to support the prenatal life<sup>2</sup>. The examination of the placenta in utero as well as postpartum, gives valuable information about the state of the foetal well being<sup>3</sup>. Careful examination of placenta can give information which can be useful in the management of complications in mother and the newborn.

The Maternal mortality rate in India has declined from 570 in 1990 to 230 per one lakh population in 2008<sup>4</sup>. But, still it remains high in comparison to developed countries and is largely preventable. The hypertensive disorders are responsible for 5-8 % of all maternal deaths<sup>5</sup>. Pregnancy complications like hypertension or gestational diabetes are reflected macroscopically and microscopically in the placenta<sup>6,7,8,9</sup>. In pregnancy induced hypertension, there is increased resistance to utero-placental circulation which adversely affects the growth of placenta in terms of weight, thickness, surface area and volume. These abnormalities ultimately result in unfavourable outcome of pregnancy with reduction of fetal weight.<sup>10,11</sup>

Hence, this study was done to correlate the morphological parameters of placenta with foetal parameters in both normal and hypertensive mothers.

### MATERIAL & METHODS

The present study of placenta with its clinical significance was conducted in the Department of Anatomy in collaboration with Department of Obstetrics during the period of Jan – Jun 2017. Before this study, permission was taken from the Institutional Ethical committee & Head of Obstetrics & Gynaecology. A total of 100 cases were studied, 50 cases belonged to pregnancy induced hypertension (PIH) and 50 cases belonged to normal pregnancy (Control Group). Placentae were collected from labour room and gynaecology operation theatre of Rama Medical Hospital & Research centre, Hapur (U.P.). All pregnant females of age 20 -35 years, para 1-4, gestational age 38-42 wks delivered either by vaginal route or caesarean section were included. In pregnancy induced hypertension, only those cases having

blood pressure 140/90mm of Hg or above, with or without oedema, and/or proteinuria were included. Pregnant females with medical complications like diabetes, hypothyroidism, jaundice, multiple pregnancies were excluded.

Placenta with its cord were collected immediately after delivery, both from normal deliveries & caesarean section. The collected placenta was washed under running tap water, then cord & membrane were examined for abnormalities. All the specimens were tagged with number discs & then preserved in 10% formalin solution. Weight of placenta in grams, volume in millimeter, diameter of placenta in centimeter, the site of umbilical cord insertion, the shape of the placental disc, number of cotyledons, presence of calcification & foetal weight were recorded as shown in fig no.1 -6. All the morphometric parameters of the placenta were recorded. Data analysis of the obtained values were performed statistically using SPSS software version. The results of each parameters were presented in tables & figures. All the morphometric parameters of placenta were measured & compared with hypertensive placenta, p value of less than 0.05 was considered to be statistically significant.



Figure no.1 Showing the weight of the placenta.



Figure no.2 Showing different shapes of placenta.



Figure no. 3 Showing the method of counting cotyledons.



Figure no. 4 Showing the different sites of insertion of umbilical cord.

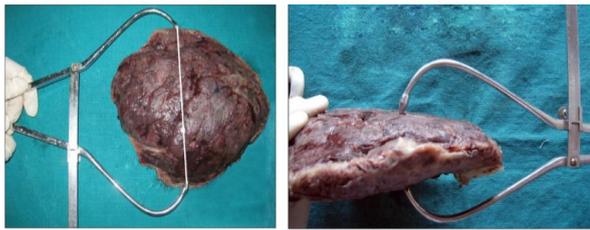


Figure no 5b Showing the measurement of diameter of placenta

Figure no 6 Showing the measurement of thickness of placenta

**RESULTS**

In present study on 100 placentae, 50 from normal mothers (control group A) & 50 from hypertensive mothers (study group B) following observation are as -

**As per Table no.1** - In present study, the mean diameter in control group is  $15.54 \pm 1.47$  mm & in study group  $14.07 \pm 1.07$  mm, the mean thickness in control group is  $1.88 \pm 0.29$  mm & in study group is  $1.85 \pm 0.38$  mm, the mean surface area in control group is  $191.04 \pm 33.16$  mm<sup>2</sup> &  $156.6 \pm 24.43$  mm<sup>2</sup> in study group, the mean volume in control group is  $459 \pm 98.3$  ml &  $385.23 \pm 75.1$  ml. The mean surface area of placenta in study group was  $156.6 \pm 24.43$  as compared  $191.04 \pm 33.6$  in control group which was significantly less in pregnancy induced hypertensive group as shown in fig no 2 & 3. In our study it shows that all the morphometric parameters were less in study or pregnancy induced hypertensive group & the difference was highly significant ( $p < 0.05$ ). The mean no. of cotyledons in control group is  $20.47 \pm 3.93$  while it was less in study group  $15.12 \pm 1.89$ . The mean number of cotyledon was reduced significantly ( $p < 0.05$ ) in study group.

**As per Table no.2** - The mean weight of placenta in study group was **400 gm** as compared **493.8 gm** in control group which was significantly less in pregnancy induced hypertensive group. The mean birth weight of newborn baby in study group was 1976.4 grams and in control group was 2684.6 grams. The incidence of marginal insertion of cord also have significant values which were 74 % in study group and 26 % in control group. This indicates that mean birth weight of newborn baby was low in study group. It was observed in present study of 100 placentae, 50 were from full term normal babies between 38 to 42 weeks of gestation and birth weight more than 2500 grams while remaining 50 were from small for gestational age babies between 38 to 42 weeks of gestation and birth weight less than 2500 grams.

In both the groups there was a significant positive correlation between birth weight and placental weight and between birth weight and placental volume as shown in graph no 1. The mean number of infarcted and calcified areas had significantly higher values in the study group than control group.

The various observations & results are tabulated & depicted as below-

**TABLE-1 MORPHOLOGICAL COMPARISON OF PLACENTAE IN CONTROL & STUDY GROUP**

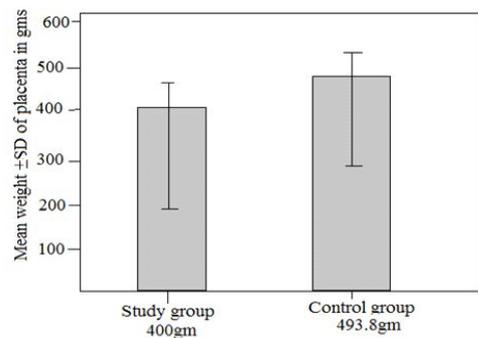
S. No.	Placental Parameters	Group A n=50 Mean±SD	Group B n=50 Mean±SD	P value p=0.05
1	Diameter (in cm)	15.54±1.47	14.07±1.07	0.004
2	Thickness (in cm)	1.88±0.29	1.85±0.38	0.003
3	Surface Area (in cm <sup>2</sup> )	191.04±33.16	156.6±24.43	0.002
4	Volume (in ml)	459 ±98.3	385.23±75.1	0.003
5	No. of cotyledon	20.47 ± 3.93	15.12±1.892	0.005

**P value < 0.005 is significant**

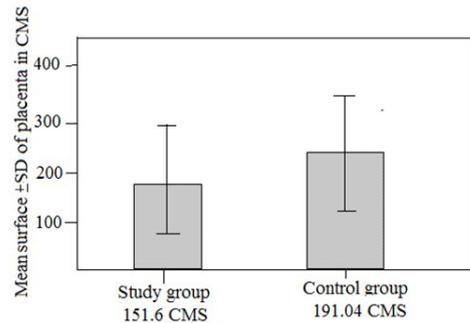
**TABLE-2 COMPARATIVE STUDY OF BABY WEIGHT, PLACENTAL WEIGHT IN BOTH GROUP**

S. No.	Placental Parameters	Control Group A	PIH Group B	Statistical Significance
1	Mean birth weight of babies in Kg	2.684 Kg	1.9764 Kg	0.003
2	Mean placenta weight in grams	493.8 gm	400 gm	0.001
3	Marginal insertion of umbilical cord (%)	26%	74%	0.005

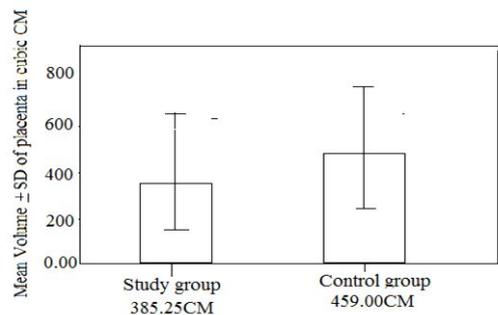
**P value < 0.005 is significant**



**Fig - 1. Comparison of mean placenta weight between two groups.**



**Fig - 2. Comparison of mean Surface area of placenta between two groups.**



**Fig - 3. Comparison of mean placenta Volume between two groups.**

**DISCUSSION**

Morphometric parameters of placenta like weight, volume, surface area were functionally significant parameters as it is related to fetal metabolism. In the present study, the mean placental weight & surface area of placenta were lower in hypertensive group as compared to normal group & were statistically significant ( $p < 0.05$ ). Our study shows that as the severity of hypertension increases, morphometric parameters of placenta like placental weight, volume & surface area were decreases and the incidence of intrauterine growth retardation rises. Similar findings were reported in studies by Rath et al<sup>12</sup>, Uдания & Jain<sup>13</sup>, Majumdar et al<sup>14</sup>, Kishwaria et al<sup>15</sup>, Lodhe & Mane<sup>16</sup>, Meyur et al<sup>17</sup>, Navbir et al<sup>18</sup>, Kaur et al<sup>19</sup>, Zia –ur-rehman et al<sup>20</sup>, Godwa & jayanti<sup>21</sup>, Gyan et al<sup>22</sup>.

The present study showed that majority of placentae in control group had eccentric insertion of umbilical cord followed by central insertion as compared to PIH group majority of placentae had marginal insertion of umbilical cord similar to Pretorius<sup>23</sup>, Rath et al<sup>12</sup>, Majumdar et al<sup>14</sup> & Lodhe & Mane<sup>16</sup> but in the study done by Ashfaq et al<sup>24</sup> & Navbir et al<sup>18</sup> they observed only central or eccentric insertion of umbilical cord in control as well as hypertensive groups.

In the present study, the mean Cotyledon numbers were found to be significantly less in hypertensive group which is similar to the findings of the study by Sultana S and et.al<sup>25</sup> Majumdar et al<sup>14</sup>, Lodhe & Mane<sup>16</sup>, Zia –ur-rehman et al<sup>20</sup>, Godwa & jayanti<sup>21</sup>.

In the present study, the mean central thickness & mean placental diameter in hypertensive group was less as compared to control group. Similar results were seen in studies done by Zia –ur-rehman et al<sup>20</sup> but on the other side study done by Ashfaq et al<sup>24</sup> reported higher value of mean placental diameter in hypertensive pregnancies which was found to be insignificant.

The mean fetal weight was less in hypertensive group than control group. The same ratio was found less in the hypertensive group than control group by Garg et al<sup>26</sup>. In the present study infarcted areas, calcified areas were seen significantly more on the placenta in hypertensive group as noted by others<sup>12-22</sup>. This finding has also been implicated in the induction of hypertension.

## SUMMARY & CONCLUSION

The morphometry of placenta like weight, surface area and volume show significantly lower values in the hypertensive group than the normotensive group. Placental weight and size are directly proportional to the birth weight of babies. Hypertensive disorders in pregnancy influence the morphology of placenta which adversely affects the perinatal outcome. The early measurements of placenta by noninvasive technique like ultrasonography will be helpful in early identification of at risk fetus and better management of such pregnancies.

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