

ORIGINAL ARTICLE

WEIGHT AND VOLUME OF PLACENTA IN NORMOTENSIVE PREGNANCIES VERSUS PREGNANCY INDUCED HYPERTENSION

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ABSTRACT

Background: Pregnancy-induced hypertension adversely affects the development of placenta and growth of fetus. The objective of the study was to compare the weight and volume of placentae in normotensive pregnancies versus patients with pregnancy-induced hypertension.

Material & Methods: This comparative cross-sectional study was conducted in the Department of Anatomy, Gomal Medical College, D.I.Khan, from January 2014 to October 2014. Sample size was 150. Consecutive sampling technique was used. Inclusion criteria was pregnant women of all ages and parity. Grouping variable was presence of PIH with two attributes of yes and no. Research variables were placental weight in grams and placental volume in milliliters. A total of 150 placentae with the cord were collected after delivery from pregnant women, from the labour room of obstetric unit, DHQ Teaching Hospital, D.I.Khan. Structured proforma was used to record the presence or otherwise of PIH. Subjects were divided into two groups on basis of presence or absence of PIH; group A with 50 normotensive pregnant females and group B with 100 patients with PIH. Placental weight and volume were measured in terms of mean \pm SD, whereas categorical variables as frequency and percentage. Students t test was used in Social Sciences Online calculator.

Results: Out of 150 patients, 50 were normotensive and 100 were having PIH. Mean weight of placentae in groups A and B were 421.40 ± 17.90 g and 320.60 ± 14.95 g respectively whereas mean volume of placentae in groups A and B were 396.10 ± 10.40 ml and 280.50 ± 10.35 ml respectively. ($p < 0.01$).

Conclusion: The placental weight and volume is significantly less in pregnancies with PIH in comparison to pregnancies with normal blood pressure.

KEY WORDS: Placenta; Pregnancy; Hypertension; Pregnancy-Induced.

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INTRODUCTION

Gestational or pregnancy-induced hypertension (PIH) is the development of hypertension after 20th week of pregnancy in previously normotensive female and no significantly detected proteins in the urine.¹ Mild PIH is diastolic BP 90-99 mmHg, and systolic B.P 140-149 mmHg. Moderate hypertension is diastolic BP 100-109 mmHg and systolic B.P is 150-159 mmHg and severe

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hypertension is diastolic BP 110 mmHg or greater, systolic blood pressure 160 mmHg or greater.²

Every year 585,000 maternal deaths occur due to complications of pregnancy and labour. More than 99% deaths occur in under-developed countries.^{3,4} It is estimated that hypertensive disorders of pregnancy cause about 12% of maternal deaths in the world.^{4,5} Pre-eclampsia, a severe form of hypertensive disorder of pregnancy, complicates about 5-7% of all pregnancies in the world⁶ and is responsible for 15.9% maternal deaths in United States.⁷ In Pakistan about 75% of population is present in rural areas, where majority of the patients are not receiving proper antenatal care and they present to the tertiary care hospitals with complications of PIH.⁸ Placenta is affected by the complexities of intrauterine life and in order to prevent complications of the fetus, it shows

an adaptive response. There may be changes in shape and function, and reduction in weight and volume.⁹

A study conducted in India compared the morphology, morphometry and histology of placenta in hypertensive pregnancies and normotensive pregnancies. It was concluded that there is significant decrease in weight, volume, surface area and infarction in hypertensive group than control.¹⁰ Infarction, calcification and retroplacental hematomas formation were noted in eclamptic patients.¹¹ A study conducted in Lahore showed the prevalence rate of hypertensive disorders to be 3.2%. Another study from Peshawar in year 2003 reported a prevalence of 1.65%.¹² Hypertension in some form effects 15-20% of pregnancies and the frequency of eclampsia is about 3/100 as reported in a study conducted in Abbottabad.¹³

Great attention is being paid to the management of patients with PIH and its complications but as for placenta is concerned little work is done to see the morphological changes of placenta in PIH.

The operational definition of PIH for this study was diastolic BP ≥ 90 mmHg and systolic BP ≥ 140 . The objective of the study was to compare the weight and volume of placenta in normotensive pregnancies versus patients with pregnancy-induced hypertension. Two null hypotheses were of no difference in weight and volume of placenta in normotensive and PIH pregnancies.

MATERIAL AND METHODS

This comparative cross-sectional study was conducted in the Department of Anatomy, Gomal Medical College, D.I.Khan. The duration of study was from January 2014 to October 2014. Sample size was 150. Consecutive, non-random sampling technique was used. Inclusion criteria was pregnant women of all ages and parity. Patients with essential hypertension, chronic renal disease, chronic liver disease, diabetes mellitus, gestational diabetes, any kind of tobacco use, twin pregnancy, incomplete delivery of placenta, abruptio placenta, placenta previa, any other convulsive disorder, any type of congenital abnormalities, hydrops fetalis and intra uterine death were excluded. Grouping variable / factor was presence of PIH with two attributes of yes and no. Research variables were placental weight in grams and placental volume in milliliters.

A total of 150 placentae with the cord were collected after delivery from pregnant women, from the labour room of obstetric unit, District Headquarters Teaching Hospital, D.I.Khan, Pakistan. Structured proforma

was used to record the presence or otherwise of PIH. Subjects were divided into two groups on basis of presence or absence of PIH; group A with 50 normotensive pregnant females and group B with 100 patients with PIH.

Placentae were collected from labor room immediately after delivery and preserved in 10% formalin. Samples were shifted to Anatomy department for inspection. Placentae were washed with normal saline to remove blood clots, gently pressed to remove extra blood and mopped with cotton. Umbilical cord was cut nearest to its insertion on placenta, and membranes were trimmed at the margins. Placental weight was measured by placing it on the weight machine and expressed in grams. Volume of placenta was calculated by graduated jar of 2000 ml capacity. It was filled with 500 ml of water. Then placenta was placed in the jar. Increase in volume was noted and expressed in milliliters (ml).

The quantitative variables of weight and volume were expressed in terms of mean \pm SD, whereas categorical variables as frequency and percentage. Students t test was used in Social Sciences Online calculator.

RESULTS

Out of 150 patients, 50 were normotensive and 100 were having PIH. Mean weight of placenta in groups A and B were 421.40 ± 17.90 g and 320.60 ± 14.95 g respectively whereas mean volume of placenta in groups A and B were 396.10 ± 10.40 ml and 280.50 ± 10.35 ml respectively ($p < 0.01$). Table 1

DISCUSSION

In present study it was observed that the placental weight was significantly less in hypertensive group. Decrease in placental weight is attributed to disturbance in the process of remodeling of maternal spiral arterioles in the 1st trimester of pregnancy. This leads to high resistance and decreased flow vessels resulting in decreased perfusion and underdevelopment of placenta ultimately resulting in reduction in weight of placenta.¹⁴

One study revealed that the mean weight of placenta in control group was 401.8 g and in hypertensive group it was 312.93 g with high significance p-value.¹⁵ These results support the results of our study. Significant reduction in weight of placenta between hypertensive group was observed in a study, which also correlates with the results of present study.¹⁶ Results of the present study are in line with the results of previous studies which have also shown a significant difference in placental weight in hypertensive pregnancies.^{9-11,16,17}

Table 1: t-test application to compare placental weight and volume in group A (normotensive) vs. group B (PIH) in D.I.Khan, Pakistan (n=150).

Research variables	Group A (n=50)	Group B (n=100)	P value
Placental weight (grams)	421.40 ± 17.90	320.60 ± 14.95	< 0.01
Placental volume (ml)	396.10 ± 10.40	280.50 ± 10.35	< 0.01

It is also observed in this study that the placental volume is less in PIH. Possible explanation to this reduction in volume is the same pathological events in hypertensive patients in 1st trimester of pregnancy that have caused reduction in weight. These results also correlate with the results of the previous studies.^{8,10,17-19}

CONCLUSION

The placental weight and volume is significantly less in pregnancies with PIH in comparison to pregnancies with normal blood pressure.

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CONFLICT OF INTEREST

Authors declare no conflict of interest.

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None declared.

AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	SA, SZ, SY, SR, JK, UU
Acquisition, Analysis or Interpretation of Data:	SA, SZ, SY, SR, JK, UU, FW
Manuscript Writing & Approval:	SA, SZ, SY, SR, JK, UU, FW

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.



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