Introduction: PIH is a common condition associated with changes in placenta. It leads to increased perinatal mortality. The present study was conducted to assess the morphological and histopathological changes in placenta in cases of pregnancy induced hypertension. Subjects and Methods: The present comparative study included 49 cases of PIH and 49 normotensive mothers. Clinical details and placental morphology were noted. Results: That the two groups are similar with no significant difference. Placental weight and diameter were similar in PIH and control groups (p>0.05). However, placental thickness and number of cotyledons were greater in PIH group (p=0.00) while placental volume was lower with significant difference (p=0.01). PIH group showed greater proportion of infarction, calcification, hyalinised area per 10 lpf and intervillous haemorrhage (p=0.00). Conclusion: PIH leads to gross and microscopic changes in placental morphology.

Keywords: Comparative Study, Histology, Morphology, Placenta, Pregnancy induced hypertension

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The present study was conducted to assess the morphological and histopathological changes in placenta in cases of pregnancy induced hypertension.

**Subjects and Methods**

**Study setting:** The present study was conducted at the Department of Anatomy, VIMS, Pawapuri, Bihar.

**Study Design:** The present study was hospital-based cross-sectional in nature.

**Study period:** The study was conducted between September 2018 to December 2018.

**Study subjects:** The study subjects included two groups. Mothers suffering from PIH were included in the study group while normotensive mothers constituted the control group. Seriously ill patients and those who refused to give consent were excluded.

**Sampling:** All the mothers suffering from PIH (blood pressure of 140/90 mm of Hg or more, with or without oedema and/or proteinuria) and reporting to the hospital during the study period were included in the study group. A total of 49 mothers were selected. An equal number of normotensive mothers were selected and these constituted the control group. The mothers in the control group were randomly selected. Seriously ill mothers and those with hypertension prior to pregnancy were excluded.

**Data collection procedure:** The OBG ward of the institute was visited and study and control groups were recruited in the study. Pre-tested proforma was used for data collection which included questions regarding background information and details of pregnancy. Details regarding PIH were noted in the study group.

The placenta was collected soon after delivery and weight were noted. Placentae were perfused with 10% formalin through umbilical vessels. This was followed by immersion in a jar containing 10% formalin for 48 hours. Gross examination of the placentae was done to note the presence of any infarction, calcification and retro placental clots. Tissues were taken and processed for histological observations for light microscopic studies from site near the attachment of umbilical cord, margin and centre of the placenta. Slides were stained with Haematoxylin and Eosin (H & E) to study the histology of placenta. In light microscopic examination of the placental villi were screened for counting of number of syncytiotrophoblastic knots per 100 villi, fibrinoid necrosis, intervillous haemorrhage, cytotrophoblastic cellular proliferation and calcification.

**Data analysis:** Data was entered in Microsoft Excel and analyzed using SPSS software. Percentage, proportions and contingency tables were used for describing the data. P value <0.05 was considered as statistically significant.

**Ethical consideration & permission:** Approval from Institutional Ethics Committee was obtained. Informed consent was taken from the patients. Confidentiality of records was maintained.

**Results**

A total of 98 subjects were included in the present study. [Table 1] shows background characteristics of PIH group and controls. It is seen that the two groups are similar with no significant difference with respect to age and parity (P>0.05). However, the gestational period was lower in PIH group and the difference was significant (p=0.00).

![Figure 1: Showing histological changes](image)

| Characteristic                  | Control group (n=49) | PIH group (n=49) | Significance |
|--------------------------------|---------------------|-----------------|--------------|
| Age (in years)                 | 28.9±4.2            | 29.3±4.1        | t=0.47, p=0.63 |
| Parity                         | 2.1±0.9             | 2.3±1.0         | t=1.04, p=0.30 |
| Gestational period             | 37.8±1.3            | 36.9±0.9        | t=3.98, p=0.00 |

[Table 2] shows placental morphology. Placental weight and diameter were similar in PIH and control groups (p>0.05). However, placental thickness and number of cotyledons were greater in PIH group (p=0.00) while placental volume was lower with significant difference (p=0.01).

[Table 3] shows findings of histopathological examination. PIH group showed greater proportion of infarction, calcification, hyalised area per 10 lpf and intervillous haemorrhage (p=0.00). There was decreased villous
vascularity in this group (p=0.00) while number of syncytial knots per 100 villi were more with a significant difference (p=0.00).

**Discussion**

Placental condition denotes maternal and foetal well-being and any aberration in placental morphology indicates feto-maternal compromise. PIH is one of the important conditions causing placental abnormalities. The present study explored histomorphological changes in placenta in PIH cases. Many conditions lead to changes in size, weight, thickness etc. of placenta e.g. parity, gestational age, diabetes, hypertension. Hence, the study and control groups were matched as far as possible. [7]

A total of 98 subjects were included in the present study. It is seen that the two groups are similar with no significant difference with respect to age and parity (P>0.05). However, the gestational period was lower in PIH group and the difference was significant (p=0.00). The study by Wubale et al showed that the mean age of participants was 26.46 ± 2.95 year in normotensive and 25.56 ± 2.84 year in preeclamptic mothers. Most of preeclamptic and normotensive mothers were Para 0 and Para 1 respectively. [8] Begum et al also reported that there was no significant difference in maternal age, weight, parity and gestational age among the two study groups. The mean weight of mother in PIH group had higher (64.1±8.78) than control group (59.3±5.08). The mean gestational age of the mother in PIH group was lower (37.55±1.23) than that of control group (38.1±1.02). [9]

Placental weight and diameter were similar in PIH and control groups (p>0.05). However, placental thickness and number of cotyledons were greater in PIH group (p=0.00) while placental volume was lower with significant difference (p=0.01). In the study done by Motwani et al, mean weight of the placenta was significantly lower in PIH groups (395.00 gms) than in the control group (462.16 gms). [10] similar findings were observed by Wubale et al who found that placental weight was significantly (p<0.00001) decreased in preeclamptic (456.20 ± 19.13 gram) than normotensive (499.4 ± 11.89 gram) mothers. Placental diameter and thickness in preeclamptic mothers were 17.66 ± 1.07 centimeter and 1.72 ± 0.11 centimeter respectively. [9]

PIH group showed greater proportion of infarction, calcification, hyalinenised area per 10 lpf and intervilous haemorrhage (p=0.00). There was decreased villous vascularity in this group (p=0.00) while number of syncytial knots per 100 villi were more with a significant difference (p=0.00).

### Table 2: Showing placental morphology among PIH and control groups

| Placental morphology | Control group (n=49) | PIH group (n=49) | Significance |
|----------------------|----------------------|------------------|--------------|
| Weight               | 434.8±19.1           | 398.0±17.6       | t=9.92, p=0.00 |
| Diameter             | 18.1±2.1             | 17.7±2.3         | t=0.89, p=0.37 |
| Thickness            | 1.5±0.4              | 1.7±0.3          | t=2.8, p=0.00  |
| Volume               | 391.4±109.3          | 340.1±89.2       | t=2.54, p=0.01 |
| No. of cotyledons    | 17.3±2.4             | 18.8±3.1         | t=2.67, p=0.008 |

### Table 3: Showing histopathological findings

| Histopathological findings | Control group (n=49) | PIH group (n=49) | Significance |
|----------------------------|----------------------|------------------|--------------|
| Infarction                 | 4.1%                 | 73.5%            | X2=49.2, p=0.00 |
| Calcification              | 38.8%                | 81.6%            | X2=18.5, p=0.00 |
| Hyalinenised area /10 lpf | 6.1%                 | 32.7%            | X2=10.9, p=0.00 |
| Medial coat proliferation/10 lpf | 10.2%           | 71.4%            | X2=37.6, p=0.00 |
| Intervillos haemorrhage    | 8.2%                 | 67.3%            | X2=36.0, p=0.00 |
| Decreased Villous Vascularity | 2%                 | 75.5%            | X2=55.2, p=0.00 |
| Syncytial knots per 100 villi | 25.4 ± 9.8 | 67.6 ± 11.9 | t=19.1, p=0.00 |
group showed normal histological features. Similar observations were made by Gore et al. They found that the mean number of syncytial knots was 72.6 ± 14.8 in PIH group while it was 29.3 ± 7.8 in the control group which was found significant (0.001). It was higher in PIH group compared to the control group. They found higher number of syncytial knots in preeclamptic placenta as compared to the control placenta. There was a statistically significant association between PIH and presence of hyalinised area. (p value 0.0003). The mean number of cytotrophoblastic proliferation was 16.2 ± 4.27 in PIH group while it was 3.6 ± 2.57 in control group.

Conclusion

It is concluded from the present study that PIH significantly alters placental thickness & volume and number of cotyledons. The histopathological changes are more prominent which differ significantly from normotensive subjects. Prompt treatment of PIH is needed to prevent the harm to the foetus and the mother.

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