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## A Prospective Cross-Sectional Study Of Correlation Between Neonatal And Placental Weight In Normal And PIH Pregnancy And Its Effect On Neonatal Growth.

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### ABSTRACT

Pregnancy-induced hypertension (PIH) is one of the most common complications in pregnancy leading to placental insufficiency which in turn lead to foetal morbidity and mortality. To study the mean placental weight, mean neonatal weight and correlation between neonatal and placental weight. The study was conducted in the Department of Anatomy, Sri Siddhartha medical college, Tumakuru. A total of 100 (50 normal and 50 PIH) formalin-fixed human placentae were studied. Placental weights, neonatal weight in grams were measured and the correlation between neonatal and placental weight in normal and PIH pregnancy were studied. The study was analyzed by the unpaired t-test and correlation coefficient. The mean placental weight and the mean neonatal weight were decreased in PIH pregnancy. A positive correlation between placental weight and neonatal weight was found in the present study. Study reveals, PIH cause decrease in uteroplacental blood flow which reduces the placental weight and in turn affects foetal nutrition, ultimately it decreasing the neonatal weight. Hence there is a direct correlation between neonatal weight and placental weight.

**Keywords:** PIH, uteroplacental blood flow, placental weight, neonatal weight.

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## INTRODUCTION

The placenta is the vital choriodecidual organ formed during pregnancy. It maintains pregnancy, help in growth and development of the foetus in utero, as foetus derives its nutrition from the placenta. It's a strategic location at the fetomaternal interface, provides a record of pregnancy, foetal wellbeing and intrauterine environment. Hence it is described as a mirror of the perinatal period [1, 2].

Placental insufficiency/dysfunction is most often used in connection with placental malperfusion, which is defined as a critical reduction of placental exchange membrane. Placental insufficiency is due to various factors like the abnormal genome, chronic infections, malperfusion, maternal diseases, tumours etc. Among these, one of the cause is a classical disorder called pregnancy-induced hypertension (PIH) [2].

Placental changes are directly related to the severity of PIH. Morphologically, placentae in this condition are lighter in weight, lesser in diameter and thickness with a high incidence of infarction, retroplacental hematoma and subchorionic fibrin deposition. Placentae are morphologically more affected in PIH than essential hypertension [2].

The growth of the foetus is influenced by weight and functional value of placenta. The ability of the foetus to grow and mature in womb shall be presumed to be related to the ability of the placenta to provide nutrition to the foetus.<sup>3</sup> Size of the placenta is the manifestation of foetal growth. A positive correlation is present between foetal weight and placental weight as described by Adair and The landar in 1925, Aber 1930, Margotto 1995 [3].

## MATERIALS AND METHODS

The present study work was conducted in the Department of Anatomy, Sri Siddhartha medical college, Tumakuru. Total 100 intact placentae (50 normal and 50 PIH) were collected immediately after delivery from obstetrics and gynecology department and then washed properly under running water. Intact placentae from full-term singleton delivery (normal/caesarean/induced) were included. Placentae from premature delivery, multiple pregnancies, and torn placentae were excluded. Neonatal weight and placental weight in grams were recorded immediately after delivery with the help of weighing machine. Mean neonatal weight and mean placental weight were calculated. Both neonatal and placental weight was correlated. The study was conducted after the clearance of institutional ethical committee. The data obtained were analyzed statistically using unpaired t-test. The results were considered statistically significant whenever p value is <0.05.

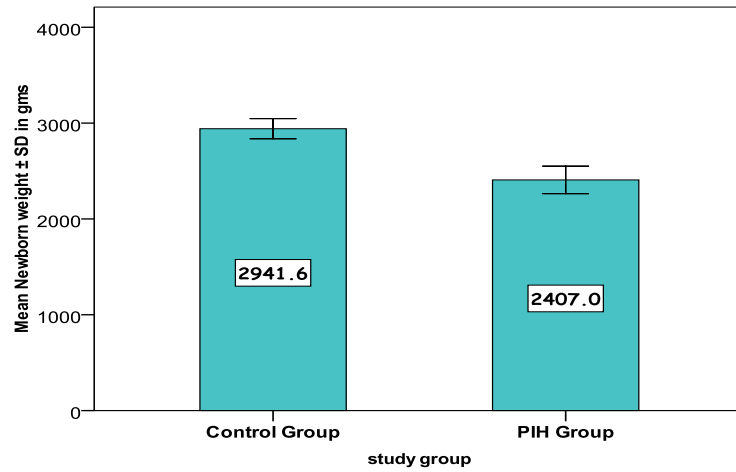
## RESULTS

This Study showed mean placental weight and mean neonatal weight was less in PIH than in normal pregnancy with statistically significant difference ( $p < 0.01$ ) [Table 1] [Fig 1] and [Table 2][Fig 2] respectively.

**Table 1: Comparison of mean neonatal weight between two groups**

|  | Control group<br>(n=50)<br>Mean± S.D <sup>o</sup> | PIH group<br>(n=50)<br>Mean± S.D <sup>o</sup> | P value* | Statistical<br>significance   |
|--|---|---|----------|-------------------------------|
| Neonatal<br>weight (gm)                                | 2941.6±369.7                                      | 2407±504.8                                    | P<0.01   | <b>Highly<br/>significant</b> |
| <sup>o</sup> - Standard deviation. * - Unpaired t test |   |   |          |                               |

The difference in the mean neonatal weight among two groups was statistically highly significant. (Table 1)

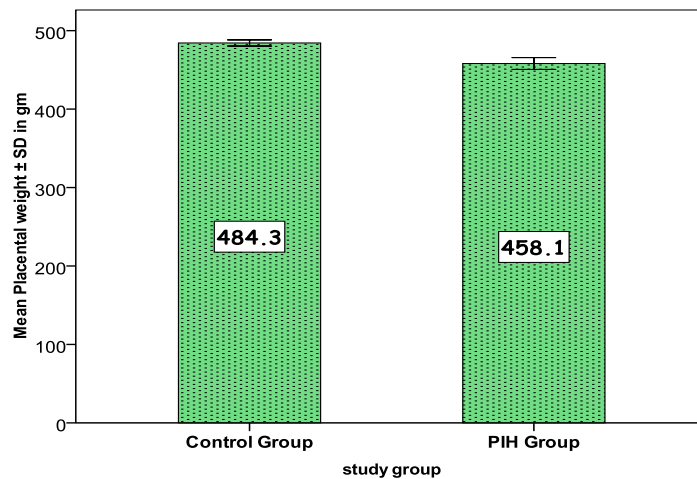


**Figure 1: Comparison of mean neonatal weight between the control and PIH group.**

**Table 2: Comparison of mean placental weight between two groups**

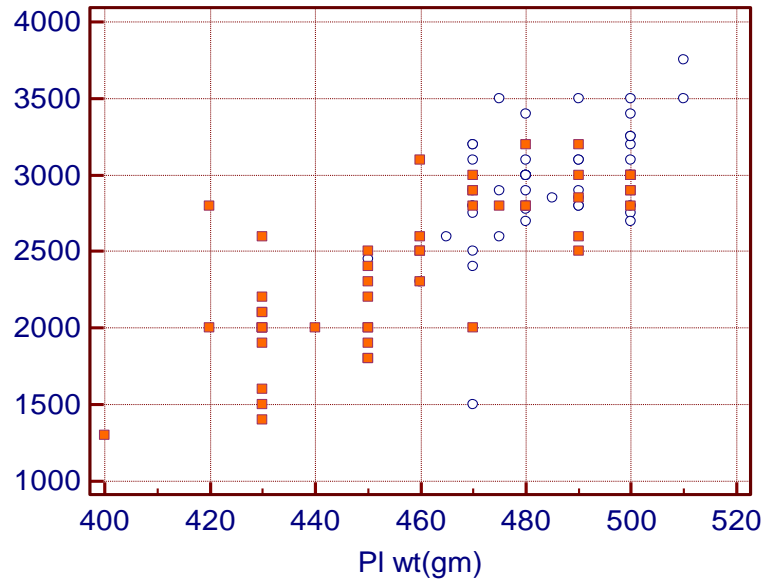
|  | Control group<br>(n=50)<br>Mean± S.D <sup>o</sup> | PIH group<br>(n=50)<br>Mean± S.D <sup>o</sup> | P value* | Statistical<br>significance |
|--|---|---|----------|-----------------------------|
| Placental weight (gm)                                  | 484.3±13.8  | 458.1±26.6                                    | P<0.01   | <b>Highly significant</b>   |
| <sup>o</sup> - Standard deviation. * - Unpaired t test |   |   |          |                             |

Above table shows (Table 2), mean placental weights is 458.1±26.6 in PIH group and 484.3±13.8 in control group. The difference between the mean placental weights among two groups was statistically highly significant.



**Figure 2: Comparison of mean placental weight in control and PIH group.**

This study also showed there is a positive or direct correlation between neonatal weight and foetal weight with a statistically significant difference at the level of p<0.01[Fig 3].



**Figure 3: Correlation between neonatal weight and placental weight in two groups.**

**DISCUSSION**

Pregnancy-induced hypertension is one of the major obstetric problems. It complicates 7-10% of all pregnancies. It is the major cause of maternal mortality and morbidity and is associated with low neonatal weight due to uteroplacental malperfusion. In the present study, it was found PIH causes low neonatal weight which is directly related to low placental weight.

According to Sheppard and Bonnar (1981) [4], vascular lesions in hypertensive pregnancy occur in uteroplacental arteries causing uteroplacental malperfusion which interfere with foetal nutrition and growth resulting in decrease neonatal weight.

Chakravorty AP (1967) [5] recorded mean neonatal weight in normal pregnancy as 2805 gm and PE group as 2724 gm. Odegard RA et al (2000) [6] noted a reduction in neonatal weight in PE. Palaskar PA et al (2001) [7] found mean neonatal weight in normal pregnancy as 2790 gm and in the preeclampsia-eclampsia group as 2368 gm. Udaina and Jain (2001) [8] found it to be 2640gm in the control group and 2280 gm in PIH. Majumdar S et al (2005) [9] recorded mean neonatal weight as 2800±32 gm in the control group and 2040±48 gm in the hypertensive group.

In the present study [Table 2]), the mean neonatal weight in PIH group is 2407±504.8 gm and in the control group, it is 2941.6±369.7 gm, indicating the mean neonatal weight is decreased in PIH than the control group. The mean neonatal weight in the control and PIH group is found to be higher than the findings of the above authors.

But the common finding among all the above studies and the present study is that the mean neonatal weight in PIH is lower than that of normal pregnancy.

According to Robertson WB et al (1967) [10] acute necrosis of vessel wall in spiral arteries which cause a reduction in uteroplacental blood flow thereby reduces the placental weight.

Adair and Thelander <sup>11</sup> (1925) found an average weight of normal placenta as 473 gm. Udaina and Jain (2001) [8] recorded it to be 495 gm. Palaskar P <sup>7</sup>(2001) found it to be 475 gm. Majumdar S et al (2005) [9] measured it as 485.8±47.3 gm. In the present study [Table 1], the mean placental weight in the control group is 484.3±13.8 gm. This finding is almost similar to the findings of the above authors.

Bazaz G et al (1979) [12], Sodhi S et al (1990) [13], Rath G et al (2000) [14] recorded decreased placental weight in hypertensive pregnancies. Udaina and Jain (2001) [8] found mean placental weight is 435.63 gm in mild PIH and 371.43 gm in severe PIH. Palaskar P et al (2001) [7] recorded mean placental

weight in preeclampsia-eclampsia is reduced to 392 gm. Majumdar S et al (2005) [9] recorded it to be 399.1±90 gm.

In the present study [Table 1], the mean placental weight is 458.1±26.6 gm in PIH group which is less than that of the control group, indicating mean placental weight is decreased in PIH than the control group. This finding is slightly higher than the findings of the above authors.

But common finding among all studies and the present study is that the mean neonatal weight in PIH is lower than that of normal pregnancy.

Younoszai and Haworth (1969) [15] stated that placental weight is in direct proportion with neonatal weight.

In the present study [Table 1] shows a positive correlation between neonatal weight and foetal weight. As the placental weight increases neonatal weight also increase. Hence any effect on placental will also affect neonate.

### CONCLUSION

With the proper use of various materials and methods, the weight of 100 placentae and weight of 100 neonates, among which 50 belonged to normal pregnancy and remaining 50 belonged to PIH group, were studied and compared. From the observations and results obtained after the present study, it can be concluded that:

- The study showed a highly significant decrease in placental weight and neonatal weight in PIH group, which may be due to uteroplacental malperfusion hampering nutrition and growth of placentae and foetus.
- Placental weight and neonatal weight has a positive correlation. As placental weight increases, neonatal weight also increases and vice-versa. Pathological changes in placentae of PIH group influence the pregnancy outcome in the form of decreased neonatal weight.

The early measurement of the placenta by non-invasive techniques like ultrasonography will be helpful in early identification of at-risk foetus and better management of such pregnancies.

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