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RESEARCH ARTICLE

CLINICAL SIGNIFICANCE AND CHANGES IN THE MORPHOLOGY OF PLACENTA IN PREGNANCY INDUCED HYPERTENSION

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Abstract

Introduction: Human placenta is the organ of exchange and connection between the fetus and mother. It is a fetal organ which experiences the stress and strain that the fetus experiences. Most common complication of pregnancy is Pregnancy Induced Hypertension. The study of placenta in Pregnancy Induced Hypertension gives a clear picture regarding the health of mother and the baby which helps in reducing the Neonatal and Maternal mortality and morbidity.

Aim To infer the clinical significance of the gross changes that occur in placenta in Pregnancy Induced Hypertension.

Materials and methods: An Observational Prospective Cohort Study was performed.Hundredspecimens of placenta were taken .out of them 50 placenta from PIH mothers ,50 were Normotensive mothers .irrespective of parity, of age group from 20-38 years from theGovernment General Hospital, Kurnool during the academic year 2021-2022..Immediately after the delivery the umbilical cord was clamped and the placenta after cutting was put in a neutral buffered normal saline.

Results: There was a significant decrease in the placental weight ,placental diameter,placentalthickness,placental surface area and fetal weight in PIH mothers when compared to normotensive mothers.The Cotyledons number was also decreased compared to the normal placenta (10-15 in number in 39% of cases) due to Pregnancy Induced Hypertension mothers.60% of observed placenta had infarctions in PIH ,5% in normotensive mothers. Retroplacental clot was seen in 70% of PIH .syncytial knots in 62% of PIH .Nearly more than 30% of pregnancy induced hypertension placenta had calcified areas.

Conclusion: The study of the placenta in Pregnancy Induced Hypertension gives a valuable information regarding the maternal and fetal well being. By diagnosing the condition prenatally by Ultra sonogram growth retardation cases can be prevented. A better management can be given to the pregnancy induced hypertension mothers thereby decreasing the neonatal and maternal mortality and morbidity.

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Introduction:-

Human placenta is a discoid, haemo-chorial, deciduate structure. It is an essential organ for the growth and development of the fetus and also for the maintenance of pregnancy.

As placenta has both maternal and fetal poles it shares the stress and strain which the fetus experiences.

It forms a morphological record of Anatomical condition, intrauterine events and intrapartum of gestation (2). Pregnancy induced Hypertension is the leading cause of maternal mortality and is an important factor in fetal distress and fetal death.[1]

During pregnancy, placenta does the function of nutrition and respiration which comprises of gaseous exchange, removal of waste products, secretion of hormones, production of blood cells).

The placenta comprises of a basal plate and a chorionic plate on maternal and fetal sides. The complications of Pregnancy induced Hypertension can be seen in placenta both microscopically and macroscopically which can be diagnosed by regular ultrasound.[2]

In Pregnancy induced Hypertension the blood into the spiral arteries is decreased.

The common fetal anomalies associated with PIH are Microcephaly, IUGR, Hypospadiasis.

From the studies of B.Vijayalakshmi et al[3] ,SeguptaKishwara et al[4],and Abu Sadat Mohammed et al[4], it was inferred that PIH has an impact on the weight of placenta and characterized by abnormal trophoblast invasion of the uterine blood vessels along with the immunological intolerance between the maternal and fetal tissues.

Because the placenta is the direct connection between the mother and the foetus, its examination gives a clear description of what happened to it while in the mother's womb and what might happen to the foetus in the future.

The study regarding the Maternal and fetal relationship and PIH helps us and is useful in the planning and management of pregnancy. Thus ,this study was carried out to see the Morphological changes in placenta of PIH Mothers and comparing with normotensive mothers.

Material And Methods:-

Study type:
Observational study.

Study design:
Prospective Cohort Study.

Study setting/area, Population and period:
The study is done at the Government General Hospital, Kurnool, Andhra Pradesh.It was carried out during the period of 2021 – 2022. .

Sampling:
A cohort of pregnant women with hypertension was selected from the women attending ,Government General Hospital, Kurnool .50 PIH patients are selected based on inclusion and exclusion criteria . Total 50 normotensive pregnant mothers were selected.

Inclusion criteria:
The pregnant mothers in the age group 20 years to 35 years attended for antenatal check up. Patients having detailed history, clinical data, consent & cooperation of patients, blood & urine report & specimen of placenta available for examination. Pregnant women having hypertension (blood pressure (BP) ≥ 140/90mm Hg). Normotensive (blood pressure of less than 140/90mmHg) pregnant mothers without any illness. Specimen of placenta collected from the full term delivery cases (i.e, cases completed 37 weeks of gestation)

Exclusion criteria:
Patients with age below 20 years and above 35 years. Mothers who underwent cesarean section, diseased mothers other than PIH, mothers with bad obstetric history and preterm deliveries and newborns with congenital anomalies were excluded.

Immediately after delivery the umbilical cord was clamped and the placenta was placed in a neutral buffer solution (10%).

Examination of the Placenta:
Examinations of placenta were conducted according to proforma adopted by Benirschke and later modified by Woodly et al [13]. The Following parameters were taken :

1. Thickness of the placenta
2. Weight
3. Diameter
4. Presence of Calcifications
5. Retroplacental hematoma
6. Infarction

Statistical Analysis
The statistical significance between the study group and normal standards were analysed by using Student's Unpaired t-test. Statistical Analysis was done by using Epi-Info software Version 3.3.2 .Statistical Tests (Pearson Chi-square Test, Independent Samples Test) were applied whenever it was necessary

Results:-

The 100 placenta were examined and the values of the parameters noted above have the following findings

Table 1:- Comparision of Parameters Between PIH and Normotensive mothers.

	PIH(Mean± SD)	NormotensiveMean±SD)	Difference	Unpaied T test	P value
Maternal age	22.5±4.45	28.16±5.69	5.66	5.54	<0.0001
Foetalweight (gms)	2164.56±216.19	3056±265.95	891.4	17.26	<0.0001
Placental weight (gms)	415.16±30.07	530.20±35.06	115.04	17.61	<0.0001
No.of Cotyledons	13.7±1.36	23.43±1.84	9.73	30.07	<0.0001

In both groups ,age of the patient ranged from 20 to 35yrs and both are delivered at term pregnancy .Mean age 22.5 years ±4.45(SD) in PIH , and 28.16 Years ±5.69(SD) in Normotensive. Normotensive group had 94% normal birth weight in comparison to PIH , which was 60%

Mean birth weight of baby in hypertensive and normotensive groups was 2.164.56 kilogram ± 216.19 S.D) 3056±265.95(S.D) respectively.

Mean placental weight among PIH and normotensive groups was (S.D) was 415.16±30.07 and 530.20±35.06 (S.D) respectively (lower in PIH) and the difference was found to be statistically significant. P value <0.0001

Table 2:- Comparision of placental Morphology Parameters Between PIH and Normotensive mothers.

Parameters		PIH	Normotensive	Significance
Thickness in cm	>2cm	2(4%)	44(88%)	Chi square -71.01
	<2cm	48(96%)	6(12%)	P value <0.001
Diameter:in cm	>16cm	12(24%)	43(86%)	Chi square 38.82
	<16cm	38(76%)	7(14%)	P value <0.001
Calcifications	Absent	18(64%)	44(88%)	Chi square -28.69

	Present	32(36%)	6(12%)	P value <0.001
Retroplacental hematoma	Present	35(70%)	17(34%)	Chi square -16
	Absent	15 (30%)	33(66%)	P value <0.001
Infarction	Present	30(60%)	10(10%)	Chi square -16.6
	Absent	20(40%)	40(90%)	P value 0.001
syncytial knots	Present	44(88%)	18(64%)	Chi square -28.69
	Absent	6(12%)	32(36%)	P value 0.001

A significant amount of Calcifications ,Retroperitoneal hematoma ,infarcts were seen in the placentae of mothers with PIH compared to normotensive mothers and this was statistically significant.

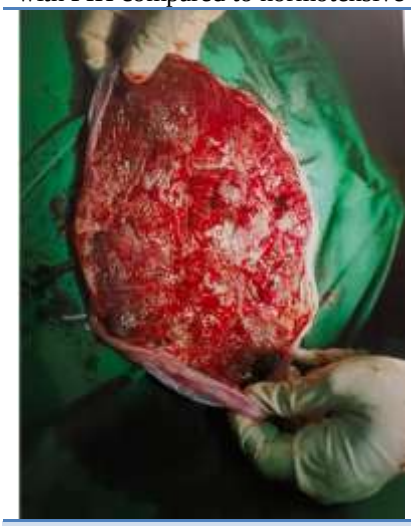

FIG NO:1 Placenta showing Haematoma

FIG NO:2 Placenta showing decreased number of cotyledons

FIG NO:3 RetroplacentalHaematoma

FIG NO:4 Placenta with Calcification

FIG NO:5 Placenta showing Haematoma

FIG NO:6 :Placenta with reduced diameter

Discussion:-

The current study found a significant decrease in placental weight, foetal weight, and the number of cotyledons in PIH mothers, as well as an increase in the number of infarcts and calcified areas in the PIH placenta.

The minimum age of the cases in the current study was 20 years, and the maximum age was 35 years. The highest number of cases were found in the third decade of life. The commonest age range of the mothers in PIH and PE was 20 - 24 years. The age range of 25 - 29 years was the next common.This correlates with the study of Akhlaq M et al[6]. andDhakal B, Singh et al[7]

The weight of a newborn baby in PIH is significantly lower, according to this study. This is consistent with the findings of Narasimha A et al.,[9]Kartha S et al., [10] and Udainia A et al.[11]

Placenta weighs normally 450-500 g. In the present study, the mean placental weight was 415.1g.This could be due to compensatory hypertrophy of the placental mass following placental insufficiency caused by insufficient utero-placental blood flow, as described by Fox [8] and Wigglesworth. [17]. This was in concordance with the study conducted by Majumdar S et al, [12]Udainia A[11] and Jain ML, Kambale T et a[17].Kartha Sand Poothiode U[10].

In a normal placenta, the number of cotyledons ranges from 19 to 23.The number of cotyledons in PIH placenta ranged from 12 to 16. The average number of cotyledons in the PIH placenta was 13, which matches the findings of Goswami PR and Shah SN et al..[13]

Thickness and Diameter of placenta is decreased in placenta of PIH , Similar observation was also made by Dutta,[14]Majunatha HK..[15]

In this study, approximately 18 placenta shows calcified areas on an average were observed in the placenta of PIH mothers .Similar findings were reported by Goswami PR, Shah SN, Kartha S, and Poothiode U,[10] who found 36 percent and 21 percent of calcified areas in the placentas of PIH mothers, respectively.

A significant number of infarcts in the placenta of PIH observed in our study is comparable with Narasimha A et al (41%)[9].1 The incidence of infarction is significantly greater than that of normal pregnancy.

The underlying pathophysiology appears to be defective remodelling of the spiral arteries, known as decidualarteriopathy, which could contribute to a hypoxic environment and, as a result, placental insufficiency, which is frequently observed in PIH pregnancies [5]

In this study ,retroplacental Hematoma was observed in 60 % of PIH mothers . . This is consistent with the findings Mathews, Fox ,Dutta; Manjunatha HK and Maham . Majumdar S et al. and Narasimha A et al. discovered a rise in the number of syncytial knots, which is similar to our findings. It is a sign of premature ageing caused by either prematurity or an underlying disease resulting placental insufficiency. . Syncytial knots following oxidative stress associated with uteroplacentalmalperfusion were seen in a significant number of mothers with hypertension compared to normotensive mothers.(

Conclusion:-

Placental weight and number of cotyledons of placenta will be significantly reduced in PIH mothers, directly had an effect on Fetal birth weight .. Primigravida were the most affected. There is an increased of infarct, and calcification , retroplacental hematoma and syncytial knots .The examination of placentae will aid in the prevention of adverse effects.consecutive pregnancies .

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