Pregnancy Induced Hypertension and its Effects on the Hematologoical Profile of Neonates

Dr Rabia Rind[1] (MBBS,FCPS), Resident OBS and Gynae. Prof Haleema A. Hashmi[2] (MBBS), MRCOG, FRCOG, FCPS) Liaquat National Hospital And Medical College Pakistan.

Introduction:

- Hypertensive disorders are the most common medical problem during pregnancy. Pregnancy induced hypertension (PIH)complicate about 12 to 22% of pregnancies [1].
- Preeclampsia toxemia is a major cause of pregnancy related maternal morbidities. However, preeclampsia also carries higher rates of morbidities and mortalities in neonates. [2]
- Many studies showed that neonates of hypertensive women, especially those who have preeclampsia, are more liable to have hematological permutation[3-5].
- These complications include 12.6 times higher risk of polycythaemia, neutropenia and thrombocytopenia occurring in as many as 22% of the population [1].
- In addition, there is increased risk of thrombocytopenia especially in neonates born to hypertensive mothers who develop preeclampsia. It is associated with increased risk of neonatal neutropenia and subsequent neonatal infections [3].

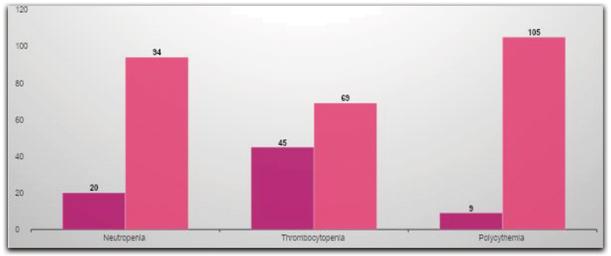
Abstract:

- **Objective:** To determine the frequency of abnormalities in the hematological profile of neonates among women with pregnancy induced hypertension.
- **Study design:** A cross-Sectional Study.
- **Rationale:** Whether pregnancy induced hypertension (PIH) affect the foetal haematological system or not, remains a controversial issue, as there is scarcity of information regarding its effect on hematological profile of neonates. The majority of these studies were conducted on a global scale, and because our environment, genetics, diet, and habits differ from theirs, local data on their significance is inconclusive and we expect to see differences in our population. In addition, this study will be helpful to draw the attention of obstetrician and neonatologist for early haematological screening and diagnosis, to prevent the associated complications by early intervention and treatment.
- **Sample Size:** Sample size was calculated through W.H.O sample size calculator by using frequency of polycythaemia (8%) [6], margin of error (d)=5%, Confidence level (C.I)=95% then the estimated sample size came out to be n=114.
- **Sampling Technique:** Non-Probability, Consecutive Sampling.
- **Inclusion Criteria** Neonates between age group 0 to 28 days. Either gender. All the neonates born to mother with pregnancy-induced hypertension in accordance with operational definition
- **Data collection procedure:** Alll the women who delivered the baby at department of Obstetrics and Gynaecology, Liaquat National Hospital Karachi, fulfilling the inclusion criteria were included in the study after taken written informed consent. About 4 mL of cord blood sample of the neonates was taken and sent to hospital laboratory for hematological profile in accordance with operational definition and results were finalized by consultant haematologist. Data recorded on specially designed approve performa.

Data Analysis

- Data was entered and analysis using SPSS version-26.0 (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp. The normality of the continuous data was tested by the Shapiro-Wilk test. Mean ± standard deviation / Median as appropriate were mother's age, parity, gestational age at onset of pregnancy induced hypertension, gestational age at delivery, APGAR score of foetuses, CBC (Hb, leukocytes, platelets) and birth weight.
  Frequency and percentage were calculated for gender of baby, mode of delivery and hematological profile of neonates i.e., (i.e.: neutropenia, thrombocytopenia and polycythaemia). Effect modifiers were controlled through stratification of age of mothers, parity, gestational age at onset of pregnancy induced hypertension, gestational age at delivery, APGAR score of foetuses, CBC (Hb, leukocytes, platelets), birth weight, gender of baby and mode of delivery to see the impact of these on hematological profile of neonates followed by appropriate Chi-Square / Fisher's Exact test consider two-sided P at level of significance α=5% as significant.

Frequency for Hematological Profile of Neonates n=114



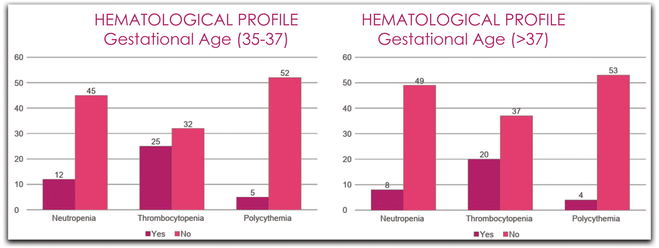
Descriptive Statistics of Shapiro-Wilk Test n=114

VARIABLE	MEAN±SD	P-VALUE
Maternal Age (years)	28.7±5.5	0.129
Neonatal Age (days)	15.2±4.8	0.117
Parity	2.2±0.7	0.092
Gestational Age at onset of PIH (weeks)	31.8±5.2	0.071
Gestational Age at delivery (weeks)	37.9±5.9	0.109
APGAR Score	6.7±2.4	0.355
HB level (g/dl)	11.8±1.2	0.258
Leukocytes (cmm)	5646.2±175.6	0.085
Platelets (mcL)	175485.4±618.7	0.711
Birth Weight (kg)	2.9±1.2	0.628

Stratification of Gestational Age at Delivery with Hematological Profile of Neonates n=114

HEMATOLOGICAL PROFILE		GESTATIONAL AGE [In weeks] 35 – 37	GESTATIONAL AGE [In weeks] >37	P-VALUE
Neutropenia	Yes	12 (10.5%)	8 (7.0%)	0.325
	No	45 (39.5%)	49 (43.0%)	
Thrombocytopenia	Yes	25 (21.9%)	20 (17.5%)	0.338
	No	32 (28.1%)	37 (32.5%)	
Polycythemia	Yes	5 (4.4%)	4 (3.5%)	0.500
	No	52 (45.6%)	53 (46.5%)	

Stratification of Gestational Age at Delivery with Hematological Profile of neonates n=114



Stratification of Gestational Age at Onset of PIH With Hematological Profile of Neonates n=114

HEMATOLOGICAL PROFILE		GESTATIONAL AGE [In weeks] 20 – 30	GESTATIONAL AGE [In weeks] >30	P-VALUE
Neutropenia	Yes	15 (13.2%)	5 (4.4%)	0.097
	No	53 (46.5%)	41 (36.0%)	
Thrombocytopenia	Yes	30 (26.3%)	15 (13.2%)	0.217
	No	38 (33.3%)	31(27.2%)	
Polycythemia	Yes	7 (6.1%)	2 (1.8%)	0.215
	No	61 (53.5%)	44 (38.6%)	

Discussion:

- Pregnancy induced hypertension is one of the most common causes of both maternal and neonatal morbidity [6]. A newborn delivered to mothers with hypertension are more liable for intrauterine growth restriction and may be delivered prematurely.
- Hypertension in pregnancy (HIP) constitutes a major health burden in The obstetric population, as it is one of the leading causes of maternal and perinatal morbidity and mortality [7].
- PIH disorders complicate about 12% to 22% of pregnancies the United States, pregnancy-related deaths have been found to be 2 to 3 times more common in blacks than in white women with HIP, accounting for 16% of the deaths [8].
- There is higher incidence of neonatal morbidity as a consequence of hypertension during pregnancy. In consequence these children are at risk for intra-uterine growth restriction and may be delivered prematurely.
- They may also suffer from the consequences of high rate operative deliveries and the adverse effects of maternal drugs.
- These neonates may also have a spectrum of hematological changes which may add to the existing morbidity in them.
- Neutropenia has also been well documented in the infants of mothers with PIH. In fact, it has been documented as the most common variety of congenital Neutropenia [9].
- Present study showed hematological profile of neonates as neutropenia in 20 (17.5%), thrombocytopenia in 45 (39.5%) while polycythemia was noted in 9 (7.9%). A study reported polycythaemia 8%, neutropenia 15% and thrombocytopenia 38% in neonates of women with pregnancy induced hypertension.
- Another study stated that neonates delivered to women with preeclampsia have a 50% incidence of neutropenia and thrombocytopenia was found in 50% [10].

Conclusion:

- It is to be concluded that **thrombocytopenia** was found to be the most common hematological profile followed by **neutropenia** and **polycythemia** respectively The sample population represents a single institutional experience; but the study sample can be generalized as the sample came from various areas of Pakistan.

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