

Research Article

First trimester High maternal haemoglobin -- an independent risk factor for Pre-eclampsia (PIH)

Dr Manjunatha S¹, Dr Amruta S Bennal², Dr R H Taklikar³

¹Associate Professor in OB/GYN, Madekeri Institute Of Medical Science, Madekeri, Karnataka, India

²Associate Professor in Physiology, Navodaya Medical College, Raichur, Karnataka, India

³Professor & HOD, in Physiology, Navodaya Medical College, Raichur, Karnataka, India

***Corresponding author**

Dr. Amruta S Bennal

Email: amrutabennal@gmail.com

Abstract: To know the association of first trimester, high maternal haemoglobin with occurrence of pre-eclampsia (PIH). Pre-eclampsia is a pregnancy specific, multisystem, hypertensive disorder characterized by new onset hypertension and proteinuria after 20 weeks of gestation and remission of signs after delivery, which is the leading cause of maternal, fetal and neonatal mortality and morbidity. Despite extensive research, the etiology and pathogenesis of Pre-eclampsia remain obscure and poorly understood. So are the association of first trimester, high maternal haemoglobin with occurrence of pre-eclampsia (PIH). The longitudinal study was conducted in the 200 pregnant women, who were enrolled in first trimester of pregnancy and followed till the delivery, with 100 pregnant women with haemoglobin >13gm% as cases and 100 pregnant women haemoglobin 11 to 13 gm% as controls. Statistical analysis was done by using Chi-square test. The pregnant women with higher haemoglobin concentration in first trimester had higher risk of developing pre-eclampsia (PIH) comparing to other pregnant women. (p value =0.003). With higher haemoglobin concentration in first trimester of pregnancy, there is higher risk for developing pre-eclampsia.

Keywords: First trimester, Haemoglobin, Pre-eclampsia

INTRODUCTION

Pre-eclampsia is a pregnancy specific, multisystem, hypertensive disorder characterized by new onset hypertension and proteinuria after 20 weeks of gestation and remission of signs after delivery, which is the leading cause of maternal, fetal and neonatal mortality and morbidity [1]. It is a pregnancy specific disorder that can affect virtually every organ system [2, 3] Pre-eclampsia is the most frequently encountered medical complication during pregnancy [4]. with, overall world wide incidence of Pre-eclampsia is 3-5% [5], but in India, overall incidence is 5-15% [6].

Pre-eclampsia is a complex pathophysiological state where regulatory systems of inflammation and endothelial function are stimulated beyond the physiological limits of normal pregnancy [7]. Though there is genetic susceptibility [8], the pathogenesis of pre-eclampsia has been enigmatic [5,8]. Despite extensive research, the etiology and pathogenesis of Pre-eclampsia remain obscure [2] and poorly understood [2, 9]. It is a disease of young and nulliparous women [5] with Occurrence more common in age less than 18 years and age more than 35 years [5,3].

Routinely haemoglobin is assessed as a part of routine antenatal check up. There are very few studies which have suggested that, high Haemoglobin concentration in first trimester of pregnancy is associated with occurrence of pre-eclampsia [10], Some studies have linked high maternal serum haemoglobin levels (Hb = 13.2gm%) in pregnancy outcomes, such as preeclampsia, preterm birth and small for gestational age [11]. Many investigators believe that the conditions for the development of preeclampsia are set as early as the first trimester [12]. In one study in primiparous, the frequency of subsequent hypertension ranged from 7% at Hb values under 10.5g/dl to 42% at Hb concentrations over 14.5g/dl [13]. We have taken this study to know the relation of first trimester high maternal haemoglobin, and occurrence of pre-eclampsia, so that the complications associated with pre-eclampsia can be prevented and mortality and morbidity can be reduced.

MATERIALS AND METHODS

This longitudinal study was conducted in the Department of Physiology, Navodaya Medical College (NMC) Raichur, with the help of OB/GYN Department,

NMC Raichur and with the assistance of laboratory setup of the Department of Biochemistry, NMC Raichur. The study and its conduct were cleared by the ethical committee, NMC Raichur.

The study was done by obtaining blood samples from study group and controls, attending OPD, in OB/GYN Department, NMC Raichur, during study period (January 2015 – May 2015). The study group consisted of 100 antenatal pregnant women in first trimester, with normal blood pressure and with hemoglobin more than 13gm%, in the age group 20 to 30years, attending the OPD of OB/GYN Department, NMC Raichur. The control group consists 100 antenatal pregnant women in first trimester, with normal blood pressure and with hemoglobin less than 13gm% and above 11gm%. Hemoglobin concentration was set to 13gm% as per this study [11].

The following individuals were excluded from study, with Age < 20 years and > 30 years, previous history of hypertension, Diabetes Mellitus, renal disease, thyroid disorder, dyslipidemia, and multiple pregnancies were excluded. Even previous history of pre-eclampsia, pregnant women with any other medication except for vitamins, Iron & Calcium, was excluded from the study. After selecting the subjects and controls, informed consent was taken. Height and weight of the individuals were measured. BMI was calculated. The subjects and controls were examined for vital signs, Pulse, Blood pressure. The subjects and

controls were advised to come for follow up every-month till delivery. Each visit the Blood Pressure was measured with same person and same apparatus. The subjects and controls were monitored till the delivery. The women with blood pressure more than Blood pressure $\geq 140/90$ mmHg after 20 weeks of gestation were considered pregnancy induced hypertension (PIH) [3].

Statistical analysis

After gathering the data, results were expressed in excel sheet and calculated for percentile. Both groups were compared regarding PIH and chi-square (χ^2) was applied and p value <0.05 was considered significant.

RESULTS

The longitudinal study was conducted in the 200 pregnant women, who were enrolled in first trimester of pregnancy and followed till the delivery. There was no statistical significant difference in the age group and other anthropometric parameters when they were included in the study. Among them 100 pregnant women with haemoglobin more than 13 gm%, were taken as study subjects and 100 pregnant women with haemoglobin more than 11 to 13 gm% were taken controls. In the study group 9 pregnant women developed pre-eclampsia and in control group 4 developed pre-eclampsia. X² test showed statistically significant difference in two groups. The results were represented in tables and graphs.

Table-1: PIH in normal Hb group and high level Hb group

	Control (%)	Study group (%)	Total	χ^2 value	p-value
Developed PIH	4 (4)	18 (18)	22	8.63	P=0.003
No PIH	96 (96)	82 (82)	178		
Total	100	100	200		

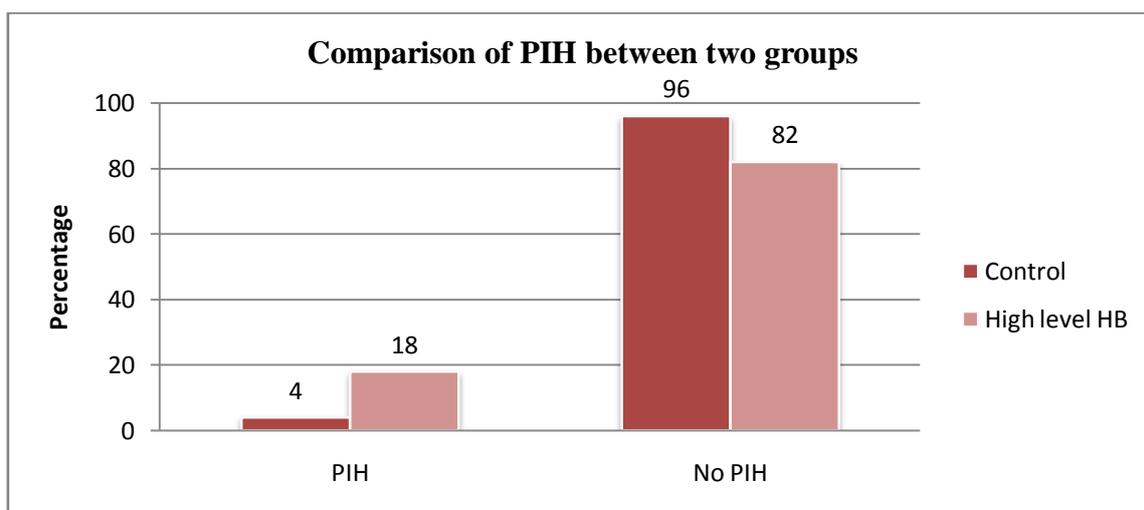


Fig-1: Comparison of PIH between two groups

DISCUSSION

This longitudinal study was conducted to know about the association of high haemoglobin concentration in first trimester of pregnancy and occurrence of pre-eclampsia. In this study we have observed that women with high Hb concentration during the first trimester were associated with higher risk of developing PIH.

Clinical findings of PIH might be explained by a generalized vasoconstriction and abnormal endothelial cell function [3]. Vasoconstriction may be attributed to the increased concentrations of Hb found in preeclampsia compared with normal pregnancy. Vasoconstriction may be attributed to the increased concentrations of Hb found in preeclampsia compared with normal pregnancy. This was proved by the study done by Sarrel *et al.*; [14]. The causes of increased Hb concentration may be free haemoglobin derived from hemolytic placental hemorrhage or less increase in blood volume. Failure of the plasma volume to expand (and of the haemoglobin concentration to drop) is associated with a ≤ 3 -fold increase in the incidence of preeclampsia in pregnancy [15]. The less increase in blood volume may be due to the loss of serum protein and the increase in capillary endothelial permeability, which in will result in relatively higher haemoglobin concentration. The increased Hb causes vasoconstriction and also prevents vasodilatation mediated. Many investigators believed that the conditions in the development of preeclampsia were set as early as the first trimester. Measuring the rate of Hb in the first visit of pregnant women is performed in all cases in routine form. This method could be beneficial for recognizing mothers who were exposed to danger and prevent the complications associated with.

REFERENCES

1. Bennal A, Kammar K.F; Role of Triglycerides –In Severity of Pre-Eclampsia. J Phys Pharm Adv 2012, 2(11): 360-364. www.grjournals.com
2. Carl A. Hubel; Oxidative Stress in the Pathogenesis of Preeclampsia: Experimental Biology And Medicine: 1999;222(3):222-235
3. Williams Obstetrics, Hypertensive disorders of pregnancy. Mc Graw-Hill 2010. 23rd Edition
4. Rubina Aziz, Tabassum Mahboob; Pre-Eclampsia and Lipid Profile: Pak J Med Sci: 2007;23(5):751-754.
5. Alice Wang, Sarosh Rana, S. Ananth Karumanchi; Preeclampsia: The Role of Angiogenic Factors in Its Pathogenesis: Physiology: 2009;24:147-158.
6. Dutta DC; Text book of Obstetrics, Hypertensive disorders in pregnancy. New Central Book Agency 2004: 6th Edition, 222.
7. Eduard Gratacos; Lipid mediated endothelial dysfunction: a common factor to preeclampsia and chronic vascular disease: European journal of obstetrics & gynecology and Reproductive biology: 2000;92:63-66
8. Broughton Pipkin, P C Rubin; Pre-eclampsia—the 'disease of theories': British Medical Bulletin: 1994; 50(2):381-396.
9. Uzun H, Benian A, Madazli R, Topcuoglu MA, Aydin S, Albayrak M; Circulating Oxidized Low-Density Lipoprotein and Paraoxonase Activity in Preeclampsia. Gynecol Obstet Invest: 2005;60:195-200.
10. Azar Aghamohammadi, Mandana Zafari, Maryam Tofighi; High maternal hemoglobin concentration in first trimester as risk factor for pregnancy induced hypertension. Caspian J Intern Med. 2011 winter; 2(1): 194-197.
11. Tarim E, Kilicdag E, Bagis T, Ergin T; High maternal hemoglobin and ferritin values as risk factors for gestational diabetes. Int J Gynecol Obstet. 2004; 84:259-61.
12. Vedernikov Y, Saade GR, Garfield RE; Vascular Reactivity in Preeclampsia. Lancet. 1999; 23:34-4.
13. Murphy JF, O'Riordan J, Newcombe J, Coles EC, Pearson JF. Relation of haemoglobin levels in first and second trimesters to outcome of pregnancy. Lancet. 1986; 1:992-5.
14. Sarrel PM, Lindsay DC, Poole-Wilson PA, Collins P. Hypothesis: inhibition of endothelium-derived relaxing factor by haemoglobin in the pathogenesis of pre-eclampsia. Lancet. 1990;336:1030
15. Murphy JF, Newcombe RG, O'Riordan J, Coles EC, Pearson JF; Relation of haemoglobin levels in first and second trimesters to outcome of pregnancy. Lancet 1986; 1:992–5.