

Frequency of Low Placental Weight in Preeclampsia

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Abstract

Objective: To determine the frequency of low placental weight in women with preeclampsia visiting to tertiary care hospital.

Methodology: This descriptive prospective cross-sectional study was conducted in Department of Obstetrics and Gynecology, Unit I, from 1st Jan 2015 to 30th December 2015. A total of 187 women with preeclampsia were included in this study. All the young women of age (18-30), history of raised blood pressure after 20 weeks of pregnancy was taken and blood pressure was noted on two occasions 4 hours apart and urine was checked for proteinuria. After the delivery of baby and placenta, outcome variable for low placental weight was measured. After that relevant data was recorded on predesigned proformas.

Results: The mean age of the patients was 23.54 ± 3.64 years. Frequency of low placental weight in women with preeclampsia was observed in 9.09% (17/187). Rate of low placental weight was high in 21 to 25 years of age women ($p=0.023$) while rate of low placenta weight was observed insignificant between gestational age and parity.

Conclusion: Pre-eclampsia is assumed to be caused by placental dysfunction; however, our results suggest that placental weight is not a useful indicator for the placental dysfunction that may be involved in pre-eclampsia.

Key Words: Pre-eclampsia, Low placental weight, Hypertension.

Cite this article as: Rehmani D, Jabeen M, Jaffri SA, Sultan S. Frequency of Low Placental Weight in Preeclampsia. J. Soc. Obstet. Gynaecol. Pak. 2018; Vol 8(4):223-226.

Introduction

Pre-eclampsia is a frequent disorder of pregnancy characterized by proteinuric hypertension. It occurs in 2-5% all pregnancies worldwide. Estimates suggest that 50,000 women die worldwide from this disease.

Pre-eclampsia is one of the leading cause induced preterm delivery and 2nd most common cause of death in late pregnancy and puerperium.¹ Pre-eclampsia is a disease of first pregnancy within a couple. A previous abortion (induced or spontaneous) or healthy pregnancy with the same partner is associated with a reduced risk of pre-eclampsia, although its protective effect is lost with

the change of partner. Placenta is a vital organ for maintaining and continuing normal healthy pregnancy. It helps in transfers of oxygen and nutrition needed by fetus. Placental examination would demonstrate information about whatever has happened with fetus. Many changes happen in placental shape and function which reflects changes in needs of fetus in various stages of growth. Placental weight which reflects placental development and is correlated with maternal age, gestational age, maternal diabetes, preeclampsia, birth weight, route of delivery, infant's gender, apgar score and fetal distress. Other contributory factors

Authorship Contribution: ¹analysis and interpretation of data, drafting and revision of manuscript, ²review methodology, drafting of manuscript, ³participated in the acquisition and data analysis, ³critical review of manuscript.

Funding Source: none

Received: Oct 2, 2018

Conflict of Interest: none

Accepted: Dec 28, 2018

influencing placental weight include parity, maternal weight and height and ferritin concentration.² Increase in placental size is associated with maternal weight and is independent predictor of newborn birth weight. It has been proven that maternal or fetal diseases (gestational diabetes, severe anemia, hypertension, hydropsfetales) influence fetal and placental weight.³⁻⁴ In one study conducted by M. Asgharina et al.⁵ reported the prevalence of low placental weight in preeclamptic women (8.1%). Little et al, established that absolute measures of infant size and placental weight had a positive correlation.⁶ Barker et al. revealed that the hypertension have occurred in later life who had been small babies with large placentas.⁷ It has been shown that placental weight has a major role in fetal growth in terms of weight and cord length but it has no role in the presence of meconium-stained fluid.⁸ A study conducted at Norway reported that in pregnancies without SGA offspring, the portion of pregnancies was evenly distributed across placental weight deciles. However, the portion of preeclamptic pregnancies was slightly higher compared with normotensive pregnancies.⁹

The aim of this study is to determine the frequency of low placental weight in pre eclamptic women. We want to conduct this study because the prevalence of low placental weight in pre eclamptic women is a sign of worsening condition and thus require early management to prevent adverse consequences especially in developing countries like ours. On robust literature search there was scant data available on magnitude of low placental weight but there is no local data available which focused on this particular issue in terms of low placental weight. The aim of our study is to set a baseline data which help to generate the current local statistics of this particular issue. In addition, by our study emphasis may be given on early diagnosis and management of low placental weight.

Methodology

This descriptive prospective cross-sectional study was conducted in Department of Obstetrics and Gynecology, Unit I, from 1st Jan 2015 to 31th December 2015. A sample size of 187 patients was calculated by the taken prevalence of 8.5 %, ⁵ 95% confidence level with an absolute precision of 5%.

All pregnant women admitted through emergency and in ward fulfilling the inclusion criteria were included after informed consent. All the young women of age (18-30), history of raised blood pressure after 20 weeks of pregnancy was taken and blood pressure was noted on two occasions 4 hours apart and urine was checked for proteinuria. After the delivery of baby and placenta, outcome variable for low placental weight was measured. After that relevant data was recorded on predesigned proformas.

Pregnant women with pre-existing medical conditions like chronic hypertension, diabetes mellitus, autoimmune disorders, thrombophilias, connective tissue diseases and liver or renal diseases and malignancies were excluded.

Data Analysis Procedure: Data was entered and analyzed in statistical package for social sciences software (SPSS-20). Mean and standard deviation was computed for quantitative variable like age, gestational age and parity. Frequency and percentage was estimated for qualitative outcome variables i.e. low placental weight. Effect modifier was controlled through stratification of age, gestational age and parity to see the effect of these on outcome variable. Post stratification applying chi-square test taken $P \leq 0.05$ as significant.

Results

A total of 187 women with preeclampsia were included in this study. The average age of the patients was 23.54 ± 3.64 years (95% CI: 23.01 to 24.07) similarly average gestational age of the women was 36.93 ± 1.23 weeks (table I).

Statistics		Age (Years)	Gestational Age (weeks)	Parity
Mean		23.54	36.93	2.35
95% Confidence Interval for Mean	Lower Bound	23.01	36.75	2.28
	Upper Bound	24.07	37.11	2.42
Median		24	37	2
Std. Deviation		3.64	1.23	0.47
Minimum		18	34	2
Maximum		30	38	3
Inter quartile Range		6	2	1

Regarding parity 122 (65.24%) women had two children and 65 (34.76%) had three children.

Frequency of low placental weight in women with preeclampsia was observed in 9.09% (17/187). Rate of low placental weight was high in 21 to 25 years of age women ($p=0.023$) as shown in table II while rate of low placenta weight was observed insignificant between gestational age and parity as presented in table III and IV respectively.

Table II: Frequency of Low Placental Weight in Women with Preeclampsia with Respect to Age Groups

Age Groups (Years)	Low Placental Weight		Total
	Yes	No	
18 to 20 Years	2(3.9%)	49(96.1%)	51
21 to 25 Years	12(16.2%)	62(83.8%)	74
26 to 30 Years	3(4.8%)	59(95.2%)	62

Chi-Square = 7.55 $p=0.023$

Table III: Frequency of Low Placental Weight in Women with Preeclampsia with Respect to Gestational Age

Gestational Age (Weeks)	Low Placental Weight		Total
	Yes	No	
34 to 36 Weeks	4(6.5%)	58(93.5%)	62
37 to 38 Weeks	13(10.4%)	112(89.6%)	125

Chi-Square = 0.78 $p=0.37$

Table IV: Frequency of low placenta weight in women with preeclampsia with respect to Parity

Parity	Low Placental Weight		Total
	Yes	No	
Two	8(6.6%)	114(93.4%)	122
Three	9(13.8%)	56(86.2%)	65

Chi-Square = 2.73 $p=0.09$

Discussion

Pregnancy complicated by preeclampsia not only affects maternal health but also jeopardize fetal health. It is believed that in these pregnancies impaired placental function, in terms of abnormal placental weight or histology, may account for this phenomenon.

The weight of the placenta is "functionally significant" because it is related to villous surface area and to fetal metabolism. Appropriate growth and development of the placenta is essential for fetal

growth and well being, and is an important factor in determining the health in adulthood.

Pregnancy complications such as hypertension or gestational diabetes invariably cause structural changes to the placenta. It has been recorded that the maternal utero-placental blood flow is decreased in pre-eclampsia because there is maternal vasospasm. In general, placental and fetal size and weight roughly correlate in a linear fashion. There is also evidence that fetal growth depends on placental weight, which is less with small-for-gestational age infants. When the rate of uteroplacental flow is chronically reduced, there is a tight direct linear correlation between the rate of mean uteroplacental blood flow and placental weight. The placenta has the ability to control the growth of the fetus. The mean birth weight and gestational age at delivery are lower, and preterm deliveries are higher in hypertension.

A total of 187 women with preeclampsia were included in our study. Regarding parity 122 (65.24%) women had two children and 65 (34.76%) had three children. Vassiliki Krielessi et al reported that in their study nulliparous women were significantly more in pregnancies complicated by severe hypertension than mild hypertension.¹⁰ Similar observation was given by Raghavendra. A. Y et al, who reported that in their study, among mild PIH cases 58.6% were primigravida while in cases of eclampsia most of the cases belonged primigravida, that is 80 %.¹¹

In our study frequency of low placental weight in women with preeclampsia was observed in 9.09% (17/187). A study of 24135 women enrolled in the National Collaborative Perinatal Project identified an increased risk of low placental weight (<10th percentile for gestational age) among women with hypertensive disorders and black women.¹² Among 3434 women delivering at Showa Hospital, Japan, women with pre-eclampsia were also found to be significantly more likely (odds ratio 2.2) to have a small placenta (<10th percentile for gestational age), not controlling for infant birthweight.¹³ These findings are similar to those reported by Mallik, Mirchandani and Chitra¹⁴, Udainia and Jain¹⁵, Majumdar et al¹⁶ and Artico et al¹⁷, who also found significant reduction in placental weight in preeclampsia. In contrast, a population-based study from Norway

found no consistent association between placental weight and pre-eclampsia when stratified by small-for-gestational-age status.¹⁸

It is generally accepted that low birth weight is linked to impaired placental function.^{19,20} Our data suggest that low placental weight is associated with placental dysfunction. However, this may not be applied at individual levels to understand fetal growth. Also, in many pregnancies with a small placenta, the fetal/placental unit is genetically programmed to be small. In our data, we could not distinguish the proportion of pregnancies with genetically small placenta from placenta with true growth restriction.

Conclusion

Pre-eclampsia is assumed to be caused by placental dysfunction; however, our results suggest that placental weight is not a useful indicator for the placental dysfunction that may be involved in pre-eclampsia.

References

1. Devisme L, Merlot B, Ego A, Hufflin Debarge V, Deruelle P, Subtil D. A case control study of placental lesions associated with pre-eclampsia. *Int J Gynaecol Obstet.* 2013; 120(2):165-8.
2. Hindmarsh PC, Geary MP, Rodeck CH, Jackson MR, Kingdom JC. Effect of early maternal iron stores on placental weight and structure. *Lancet.* 2000 Aug 26; 356(9231):719-23.
3. Henion S, Taipale P, Saarikoski S. Weights of placentae from small for gestational age infants revisited. *Placenta.* 2001 May; 22(5):399-404.
4. Godfrey KM, Redman CW, Barker DJ, Osmond D. The effect of maternal anaemia and iron deficiency on the ratio of fetal weight to placental weight. *Br J Obstet Gynaecol.* 1991; 98(9):886-91.
5. Asgharnia M, Esmailpour N, Poorghorban M, Roshan ZA. Placental weight and its association with maternal and neonatal characteristics. *Acta Med Iran.* 2008; 46(6):467-72.
6. Little RE, Zadorozhnaja TD, Hulchiy OP, Mendel NA, Shkyryak-Nyzhnyk ZA, Chyslovska N, et al. Placental weight and its ratio to birth weight in a Ukrainian city. *Early Hum Dev.* 2003 Apr; 71(2):117-27.
7. Barker DJ, Bull AR, Osmond C, Simmonds SJ. Fetal and placental size and risk of hypertension in adult life. *BMJ.* 1990 Aug 4; 301(6746):259-62.
8. Lo YF, Jeng MJ, Lee YS, Soong WJ, Hwang B. Placental weight and birth characteristics of healthy singleton newborns. *Acta Paediatr Taiwan.* 2002; 43(1):21-5.
9. Eskild A, Vatten L J. Do pregnancies with pre-eclampsia have smaller placentas? A population study of 317688 pregnancies with and without growth restriction in the offspring. *BJOG.* 2010; 117(12):1521-6.
10. Krielessi V, Papantoniou N, Papageorgiou I. Placental pathology and blood pressure's level in women with hypertensive disorders in pregnancy. *Obstet Gynecol Int.* 2012;6.
11. Raghavendra AY, Vinay KV, Veena P. A study of placental weight and fetal outcome in different grades of pregnancy induced hypertension. *Int J Anatomy Res Int J Anat Res.* 2014;2(4):625-29.
12. Baptiste-Roberts K, Salafia CM, Nicholson WK, Duggan A, Wang NY, Brancati FL. Maternal risk factors for abnormal placental growth: the national collaborative perinatal project. *BMC Pregnancy Childbirth.* 2008; 8:44.
13. Hasegawa J, Arakawa K, Nakamura M, Matsuoka R, Ichizuka K, Katsufumi O, et al. Analysis of placental weight centiles is useful to estimate cause of fetal growth restriction. *J Obstet Gynaecol Res.* 2011; 37:1658-65.
14. Mallik BG, Mirchandani JJ, Chitra S. Placenta in intrauterine growth retardation. *J Obstet Gynaecol India.* 1979; 29(4):805-10.
15. Udania A, Jain ML. Morphological study of placenta in pregnancy induced hypertension with its clinical relevance. *J Anat Soc India.* 2001; 50(1):24-7.
16. Majumdar S, Dasgupta H, Bhattacharya K, Bhattacharya A. A study of placenta in normal and hypertensive pregnancies. *J Anat Soc India.* 2005; 54(2):34-8.
17. Rath G, Garg K, Sood M. Insertion of umbilical cord on the placenta on the hypertensive mother. *J Anat Soc India.* 2000; 49(2):149-52.
18. Eskild A, Vatten L.J. Do pregnancies with pre-eclampsia have smaller placentas? A population study of 317 688 pregnancies with and without growth restriction in the offspring. *BJOG.* 2010; 117:1521-6.
19. Huebner H, Knoerr B, Betzler A, Hartner A, Kehl S, Baier F, et al. Detyrosinated tubulin is decreased in fetal vessels of preeclampsia placentas. *Placenta.* 2018 Feb;62:58-65.
20. Dimasuay KG, Aitken EH, Rosario F, Njie M, Glazier J, Rogerson SJ, et al. Inhibition of placental mTOR signaling provides a link between placental malaria and reduced birth weight. *BMC Med.* 2017 Jan 3;15(1):1.