ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

A Study On Prediction Of Pre-Eclampsia And Fetal Growth Restriction By Uterine Artery Doppler.

Mohamed Riaz*.

Assistant Professor, Department Of Radio Diagnosis, Government Medical College and Hospital, Ariyalur Tamil Nadu, India.

ABSTRACT

Pre-eclampsia during pregnancy is a complex illness involving many different physiological systems, for which no clear aetiology has been identified. Pre-eclampsia's underlying pathogenic reasons are presently the subject of investigation. The present study was conducted to predict pre- eclampsia and fetal growth restriction by uterine artery Doppler. A self-made questionnaire used for a targeted sampling of 100 people provided the basis for this study's data collection. To identify preeclampsia, an ultrasonography of the uterine artery was performed, and early diastolic notches from both sides were recorded. Subsequently, blood pressure and a urine sample were taken to check for proteinuria. One hundred pregnant women, aged 18 to 40, and participated in the study. Of pregnant women, 11% had a notch on the right side, 9% on the left side, and 14% on both sides. Among pregnant women, 66% do not have a notch between weeks 18 and 30. A third of pregnant women get proteinuria after the 30th week. Pre-eclampsia was present in 33% of women after 30 weeks of gestation. Among women, 21% experienced IGL. Thirty-four women with notches tested positive for IUGR 13 times and 21 times, whereas 66 women without notches gave false negative results for IUGR once and 65 times, respectively. According to the study's findings, 34% of the pregnant women who had uterine artery Doppler had a diastolic notch, and almost all of them (33%) were later diagnosed with preeclampsia, while 21% gave birth to children with intrauterine growth restriction. Preeclampsia and intrauterine growth restriction may be detected using uterine artery Doppler, the study found.

Keywords: Pre-eclampsia, Fetal Growth Restriction, Uterine Artery Doppler.

https://doi.org/10.33887/rjpbcs/2025.16.2.13

Corresponding author

ISSN: 0975-8585

INTRODUCTION

In addition to being major contributors to maternal perinatal morbidity and death, pre-eclampsia (PE) and intrauterine growth restriction (IUGR) are also associated with several pregnancy complications [1]. Late-onset PE is now commonly acknowledged to be a separate illness from early-onset PE. Preeclampsia (PE) at a young age is linked to aberrant foetal growth, abnormal Doppler findings in the uterine and umbilical arteries, and poor mother and newborn outcomes [1-4]. In contrast, late-onset PE tends to be linkedo modest maternal illness and a low likelihood of foetal involvement, and perinatal outcomes are often positive [2-4]. Additionally, there is solid evidence that pregnant women who had PE had a far increased risk of cardiovascular illness in the future. Compared to women who did not have PE, pregnant women with PE had a fourfold higher risk of heart failure, as well as a twofold increased risk of stroke and death from cardiovascular causes. Doppler ultrasonography is a safe, non-invasive method for measuring uteroplacental perfusion [3]. Long-term cardiovascular morbidity seems to be further influenced by the severity of PE and the gestational age of onset. Even though various screening studies have been performed between 16 and 24 weeks of gestation, the sensitivity of these investigations has varied greatly due to changes in the people screened, the Doppler techniques used, the threshold for aberrant readings, and the illness classifications used [5, 6]. Pre-eclampsia and foetal development limitation were studied in this research to see whether uterine artery Doppler might be used to predict these complications.

MATERIALS AND METHODS

The present study was descriptive observational. The study population was selected from the OPD of Government medical college and hospital, Ariyalur. Sampling method was nonprobability sampling. The study was conducted among 200 pregnant females.

Inclusion Criteria

Women who were 18–40 years old and 18–30 weeks along in their pregnancies were included.

Exclusion criteria:

Women who had had diabetes or hypertension before to becoming pregnant.

A foetal abnormality affecting a female.

Methodology

Over the course of six months from June 2023 to November 2024, the study was conducted. The researcher had the pregnant woman, or her guardian sign an informed consent form and received clearance from the institute's Ethical Committee before commencing the study. Women who were expecting children were surveyed. Early diastolic notches were obtained from both sides utilizing colour Doppler power vision ultrasonography of the uterine artery using a 3.5 MHz convex array transducer. In order to identify preeclampsia, a protein urine sample and subsequent blood pressure reading were taken. Women were placed in a semi recumbent posture while transabdominal ultrasonography was used to produce a sagittal slice of the uterus and cervical canal. Initial findings focused on the internal cervical os. Color flow mapping was then employed to distinguish the uterine arteries from other vessels that seemed to be aliasing along the cervix and uterus when the transducer was gently slanted from side to side. Pulsed wave Doppler was used to acquire flow velocity waveforms from the ascending branch of the uterine artery at the location nearest to the internal os. Using three similar successive waveforms, we were able to calculate the mean PI of the left and right arteries and draw conclusions about their relative health. An early diastolic notch, or lack thereof, may be seen in the waveform. Ultrasound records and patient data were used to compile a database of developing fetuses. The perinatal computer at the hospital was mined for data on the pregnancy's outcome. Two types of outcome measurements were employed: PET (with or without FGR) and FGR (without PET). Pre-eclampsia was defined according to the criteria established by the International Society for the Study of Hypertension in Pregnancy. Proteinuria of 300 mg or more in 24 hours, or two readings of at least + + on dipstick analysis of midstream or catheter urine specimens if no 24-h collection is available, is necessary for this diagnosis in previously normotensive women.8 Fetal growth restriction is defined as a birth weight below the 10th

centile for gestation.9 Tables were made when the information was entered into SPSS 22.

Figure 1: Uterine artery Doppler for growth restriction showing normal uterine artery waveform.

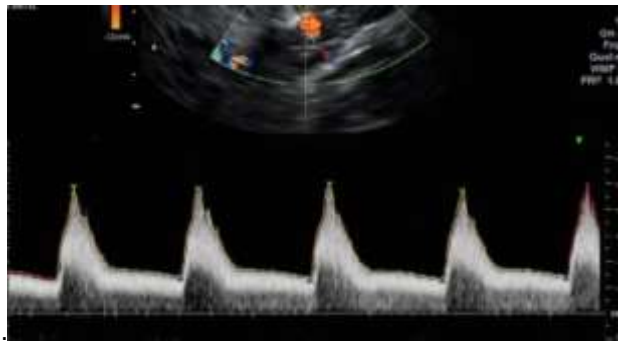

Figure 2: Uterine artery notching.

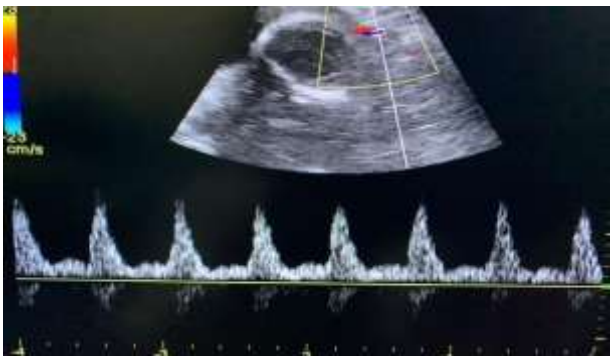

Table 1: Descriptive statistics of Notch.

Notch	N(%)`
Right	11(11%)`
Left	9(9%)`
Bilateral	14(14%)`
Absent	66(66%)`
Total	100(100%)

Table 2: Descriptive statistics of Proteinuria after 30 weeks of Pregnancy.

Proteinuria	N(%)`
Yes	35(35%)`
No	65(65%)`
Total	100(100%)`

Table 3: Descriptive statistics of Preeclampsia Preeclampsia

	N(%)`
Yes	34(34%)`
No	65(65%)`
Total	100(100%)`

ISSN: 0975-8585

Table 4: Descriptive statistics of IUGR.

IUGR	N(%)`
Yes	21(21%)`
No	79(79%)`
Total	100(100%)`

Table 5: Contingency table of Notch with IUGR Notch.

	Yes	No	Total
Yes	13	21	34
No	True positive 1	False positive 65	66
Total	False Negative 14	True Negative 86	100

RESULTS

One hundred pregnant women, aged 18 to 40, participated in the study. Of pregnant women, 11% had a notch on the right side, 9% on the left side, and 14% on both sides. Among pregnant women, 66% do not have a notch between weeks 18 and 30. A third of pregnant women get proteinuria after the 30th week. Pre- eclampsia was present in 33% of women after 30 weeks of gestation. Among women, 21% experienced IGL. Thirty-four women with notches tested positive for IUGR 13 times and 21 times, whereas 66 women without notches gave false negative results for IUGR once and 65 times, respectively (Table 1-3).

DISCUSSION

Preeclampsia is a pregnancy-related disorder characterised by hypertension and an abnormally high protein urine concentration [7-11]. Uterine artery Doppler ultrasonography is a non-invasive method of diagnosing this issue by monitoring blood flow in the uterus and pleura [12]. One hundred pregnant women, ages 18 to 40, participated in the study. Of pregnant women, 11% had a notch on the right side, 9% on the left side, and 14% on both sides. Among pregnant women, 66% do not have a notch between weeks 18 and 30. A third of pregnant women get proteinuria after the 30th week. Pre-eclampsia was present in 33% of women after 30 weeks of gestation. Among women, 21% experienced IGL. Thirty-four women with notches tested positive for IUGR 13 times and 21 times, whereas 66 women without notches gave false negative results for IUGR once and 65 times, respectively (Table 4). Doppler ultrasound of the uterine arteries was studied by Poon et al. to create an early preeclampsia prediction model. A model using clinical history (preeclampsia history, chronic hypertension, and method of conception) and maternal demographics (age, BMI, and ethnicity) alone produced 47%, 41%, and 31% detection rates for early, late, and pregnant hypertension, respectively, at a 10% false positive rate. Women who had preeclampsia or pregnant hypertension had significantly higher minimum, mean, and maximum PI in their uterine arteries. First-trimester uterine artery Doppler improved preeclampsia diagnosis rates by 81%, late preeclampsia detection rates by 45%, and gestational hypertension detection rates by 35%. Maternal factor-derived a priori risk and the lowest uterine artery PI value might be utilised in a multivariate regression model to determine an individual's probability of developing preeclampsia or hypertension in utero. From the population studied by Turk et al 10 pregnant women in their second or third trimester were diagnosed with PE, with 2 having severe cases and 8 having moderate ones. Anastasaks et al employed intra vaginal uterine artery doppler ultrasonography to examine the prevalence of preeclampsia between 23 and 25 weeks of pregnancy. About a third of pregnant women were found to have proteinuria after a urine test, whereas the same percentage of pregnant women and urine samples were protein-free [13-15].

CONCLUSION

According to the study's findings, 34% of the pregnant women who had uterine artery Doppler had a diastolic notch, and almost all of them (33%) were later diagnosed with preeclampsia, while 21% gave birth to children with intrauterine growth restriction. Preeclampsia and intrauterine growth restriction may be detected using uterine artery Doppler, the study found.

REFERENCES

[1] Murphy DJ, Striate GM. Mortality and morbidity associated with early- onset preeclampsia. Hypertens Pregnancy 2000; 19: 221– 231.

[2] Sibai B, Dekker G, Kupferminc M. Pre-eclampsia. Lancet 2005; 365: 785– 99.

[3] Crispi F, Dominguez C, Llurba E, Martin-Gallan P, Cabero L, Gratacos E. Placental angiogenic growth factors and uterine artery Doppler findings for characterization of different subsets in preeclampsia and in isolated intrauterine growth restriction. Am J Obstet Gynecol 2006; 195: 201– 07.

[4] Ness RB, Sibai BM. Shared and disparate components of the pathophysiologies of fetal growth restriction and preeclampsia. Am J Obstet Gynecol 2006; 195: 40– 49.

[5] Wu P, Haththotuwa R, Kwok CS, et al. Preeclampsia and future cardiovascular health: a systematic review and meta-analysis. Circ Cardiovasc Qual Outcomes 2017;10(02):e003497.

[6] Campbell S, Pearce JM, Hackett G, Cohen-Overbeek T, Hernandez C. Qualitative assessment of uteroplacental blood flow: early screening test for high-risk pregnancies. Obstet Gynecol 1986; 68: 649–53.

[7] Papageorghiou AT, Yu CKH, Bindra R, Pandis G, Nicolaides KH for The Fetal Medicine Foundation Second Trimester Screening Group. Multicenter screening for pre-eclampsia and fetal growth restriction by transvaginal uterine artery Doppler at 23 weeks of gestation. Ultrasound Obstet Gynecol 2001; 18: 441–9.

[8] Davey DA, MacGillivray I. The classification and definition of the hypertensive disorders of pregnancy. Am J Obstet Gynecol 1988; 158: 892–8.

[9] Yudkin PL, Aboualfa M, Eyre JA, Redman CW, Wilkinson AR. New birthweight and head circumference centiles for gestational ages 24– 42 weeks. Early Hum Dev 1987; 15: 45–52.

[10] Demers S, Bujold E, Arenas E, Castro A and Nicolaides KH: Prediction of recurrent preeclampsia using first-trimester uterine artery Doppler. Am J Perinatol 2014; 31:99–104.

[11] Lai J, Poon LC, Pinas A, Bakalis S and Nicolaides KH: Uterine artery Doppler at 30–33 weeks gestation in the prediction of preeclampsia. Fetal Diagn Ther 2013; 33:156–63.

[12] LCY Poon, I Staboulidou, N Maiz, W Plasencia, and KH Nicolaides. Hypertensive disorders in pregnancy: screening by uterine artery Doppler at 11–13 weeks. Ultrasound in Obstetrics & Gynecology 2009; 34(2): 142–48.

[13] Finn-Sell SL, et al. Pomegranate Juice Supplementation Alters Utero-placental Vascular Function and Fetal Growth in the eNOS-/-Mouse Model of Fetal Growth Restriction. Frontiers in Physiology 9:1145.

[14] Turk Ea et al. Placental MRI: Developing Accurate Quantitative Measures of Oxygenation. Topics in Magnetic Resonance Imaging 2019; 28(5):285-97.

[15] Anastasakis E, et al. Association between abnormal uterine artery Doppler flow velocimetry, risk of preeclampsia, and indices of arterial structure and function: a pilot study. Angiology 2008; 59(4):493-9.