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Role of uterine artery doppler in 12 weeks and 19 weeks of gestation in predicting preeclampsia in a tertiary care hospital

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Abstract
Objective: To study the role of uterine artery Doppler at 12 weeks and 19 weeks of gestation to predict preeclampsia in a tertiary care hospital
Methods: This was a prospective study of 100 antenatal patients of 12 weeks of singleton pregnancy attending the outpatient or inpatient sections of Department of OBG. Uterine Artery Doppler at 12 weeks along with NT scan was done. Patients with abnormal uterine artery Doppler at 12 weeks were started on Low dose Aspirin (150mg). Patients were followed up at 19 weeks with uterine artery Doppler along with anomaly scan. Patients who had any abnormal uterine artery Doppler at 19 weeks were followed fortnightly till delivery to see for the development of preeclampsia.
Results: In this study among 100 participants, 34 women had uterine artery diastolic notching at 12 weeks and were given Tab Aspirin 150 mg OD. All the patients who received Aspirin were followed up and none of the patients developed preeclampsia. At 19 weeks, 19 participants had uterine artery diastolic notching out of which 15 cases developed preeclampsia, which was statistically significant. The mean PI among cases who developed preeclampsia was 1.41±0.6 and mean PI among the cases who did not develop preeclampsia was 0.81±0.5 with significant statistical difference in mean PI (p value = <0.0001).Mean birth weight of the babies who developed preeclampsia was 2.4 +/- 0.5 kg, while mean birth weight of those who did not develop preeclampsia was 2.8 +/- 0.7 kg which was statistically significant.
Conclusion: Uterine artery Doppler at 12 weeks and 19 weeks is a screening modality for the early prediction of preeclampsia

Keywords: Fetal growth restriction (FGR), BMI, mean arterial pressure (MAP), pulsatality index (PI), resistivity index (RI), PE (Pre-eclampsia)

Introduction

Preeclampsia (PE) is a multi-organ disease characterized by development of hypertension and proteinuria. It is associated with fetal growth restriction (FGR), low birth weight (LBW) and respiratory distress [1]. It makes a major contribution to maternal and fetal morbidity, death around the world [2, 3] and represents the most common medical complication of pregnancy affecting between 7- 15 % of all gestation [4].

Women who are at risk are currently recognized based on their clinical history. Nulliparity is the most important clinical variables for preeclampsia. A higher body mass index (BMI) and other medical problems such as pre-pregnancy diabetes, prior preeclampsia or chronic hypertension are also important [5, 6] However, screening just based on maternal history identifies only 30% of women at risk for preeclampsia.

Prediction of preeclampsia has steadily evolved as the understanding of the disease's patho-physiology has grown [7]. Preeclampsia is associated with proteinuria, low platelet count, impaired liver function and renal insufficiency. Nearly 50 % of women with gestational hypertension will develop preeclampsia and the progression is much less likely if it's diagnosed early. The risk of developing preeclampsia is more if period of gestation is earlier. Early onset preeclampsia is as a result of poor placentation and vasoconstriction.

Early screening for preeclampsia will help in providing excellent antenatal surveillance and helps to decide the timing of delivery in order to avoid serious complications. Several hemodynamic and biochemical measures are also available for screening of preeclampsia, but their efficacy in diagnosis is limited [8].

The approach for prediction of preeclampsia has been based on maternal risk factors, demographic characteristics, past medical and obstetric history. The best combined tests includes measurement of mean arterial pressure (MAP), serum placental growth factor (PLGF), serum pregnancy associated plasma protein A (PAPP-A) and uterine artery pulsatality index (UA PI). In first trimester the best biochemical marker is PLGF and
PAPP-A [9]

The uterine artery pulsatality index has indeed been utilized as a marker of preeclampsia and FGR with pulsatality index (PI) increasing due to an increase in uterine artery impedance in the presence of both conditions [10]. Low-risk populations can be screened with Doppler velocimetry [11, 15]. An examination of the uterine arteries at the materno-fetal level, the Doppler waveform aids in the measurement of blood flow. Continuation of increased resistance in the uterine arteries after the 24th week of pregnancy may indicate the failure of normal placentation and the wave may have a diastolic notch [15].In the first trimester, uterine artery Doppler ultrasound has been proposed as a viable diagnostic test for preeclampsia [14, 15]. Increased impedance in the uterine circulation is hypothesized to be a result of failed trophoblastic invasion of the muscular spiral arteries in an irregular uterine artery Doppler waveform [15]

Methods

After assessment of inclusion and exclusion criteria, antenatal women of 12 weeks of singleton pregnancy attending the out-patient or in-patient were subjected to trans-vaginal ultrasound examination with uterine artery Doppler at 12 weeks along with NT scan. Patients with uterine artery Doppler changes at 12 weeks were started on Low dose Aspirin (150mg) and followed up. Patients who did not show any changes in the uterine artery Doppler were subjected to trans-abdominal ultrasound at 19 weeks with anomaly scan. Patients who showed any abnormality at 19 weeks were followed fortnightly till delivery to see for the development of preeclampsia. The results were tabulated, correlated and statistically analyzed. Patients who developed preeclampsia were further managed as per institutional protocol.

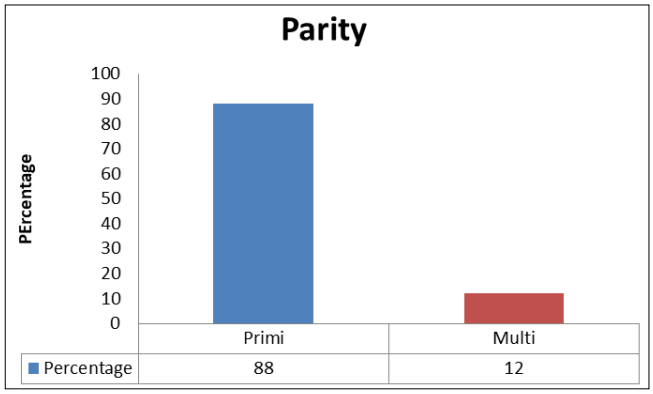
Inclusion Criteria

1. All pregnant women with singleton pregnancy, presenting between 12 weeks and 19 weeks of gestation.
2. Pregnant women conceiving after a long period from earlier pregnancy.

Exclusion Criteria

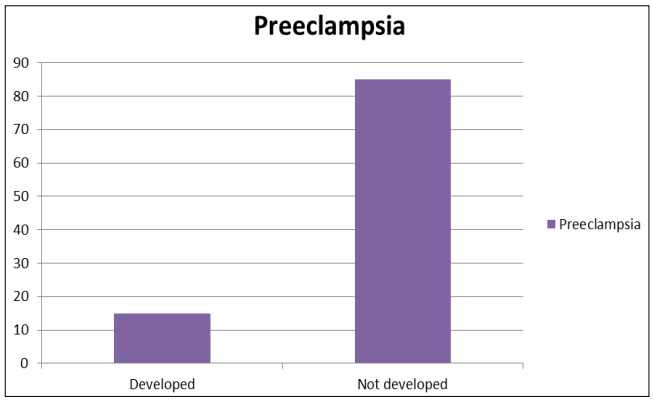
1. Assisted reproductive conception
2. Multiple pregnancies
3. Bleeding disorders
4. Medical disorders in pregnancy
5. Congenital anomaly of fetus

Results



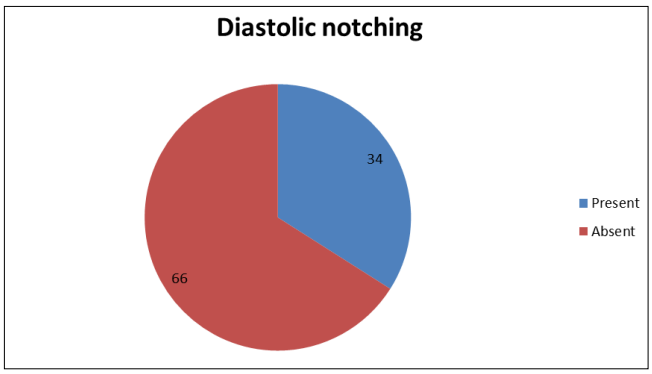
Graph 1: Proportion of cases based on parity

Out of 100 women, 88% of the cases were primigravida and 12% of the cases were multigravida



Graph 2: Percentage of women who developed preeclampsia

In this study, 15% of the antenatal mothers developed preeclampsia while 85% of the antenatal mothers did not develop preeclampsia



Graph 3: Diastolic notching at 12 weeks

In this study 34 cases had uterine artery diastolic notching at 12 weeks and 66 cases did not have uterine artery diastolic notching at 12 weeks. All patients who had uterine artery diastolic notching at 12 weeks was started on Tab Aspirin 150 mg and was followed .All the 34 patients who received Aspirin did not develop preeclampsia.

Discussion

In this current study, majority of cases were primigravida when compared to multigravida, results were consistent with the study done by Varangkana Wairachpanich *et al*.

In the present study 15% of the antenatal mothers developed PE while 85% of the antenatal mothers did not develop PE, results were consistent with the study by V.S Prasanna kumar reddy *et al*

At 12 weeks, 34% women had uterine artery notching, out of which 21% had unilateral diastolic notching and 13% had bilateral diastolic notching with mean P1 1.41 while 66 women did not have uterine artery diastolic notching, which was consistent with the study conduted by Asha Neravi, where 35 % of women had uterine artery notching at 12-16 weeks with a mean PI of 0.89.

Out of 100 women, 34 women who had uterine artery diastolic notching at 12 weeks were given Tab Aspirin 150 mg OD. All the patients who received Aspirin were followed up and none of the patients developed preeclampsia.At 19 weeks, 19 of 66 study participants showed uterine artery diastolic notching out of which 15 cases developed preeclampsia, while 4 cases did not develop preeclampsia, results were consistent with the study conducted by Maryam Razavi *et al*, where 30 cases developed preeclampsia.

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