Original Research

Assessment of role of Colour Doppler values as predictors of preeclampsia in 18-24 weeks of gestation: A radiological study

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ABSTRACT

Background: Uterine artery Doppler ultrasonography may be performed via the transvaginal or transabdominal route in the first or second trimester. Uterine artery waveforms are reported to be readily obtainable in more than 95% of patients. Hence; the present study was conducted for assessing the role of Colour Doppler values as predictors of preeclampsia in 18-24 weeks of gestation. **Materials & methods:** A total of 25 patients with gestational age between 18 weeks to 24 weeks were enrolled in the present study. Complete demographic details of all the patients were obtained. Complete clinical examination of all the patients was carried out. Colour Doppler was carried out in all the patients. Patients were followed up to delivery and examination of the neonate was done. True incidence of pre-eclampsia was assessed and was compared with colour Doppler findings. **Results:** Pre-eclampsia was found to be present in 4 patients (16 percentages of patients). However; Doppler findings were found to be abnormal in 4 patients, while it was found to be abnormal in 21 patients. Out of 4 patients with abnormal Doppler findings, pre-eclampsia was found to be present in 2 patients, while it was found to be absent in 2 patients. **Conclusion:** By identification of the high risk patients & anticipating preeclampsia patients, close monitoring can be done to reduce the morbidity and improve the outcome of pregnancy.

Key words: Pre-eclampsia, Pregnancy, Doppler

This article may be cited as: Fatima E. Assessment of role of Colour Doppler values as predictors of preeclampsia in 18-24 weeks of gestation: A radiological study. J Adv Med Dent Scie Res 2020;8(1):38-41.

INTRODUCTION

In normal pregnancy, placental trophoblast cells invade the inner third of the myometrium and migrate the entire length of the maternal spiral arteries what optimizes delivery of oxygen and nutrients to the fetus. In women who develop preeclampsia there is failure of trophoblast invasion of the uterine muscalar wall with the result that the spiral arteries retain the muscle elastic coating andimpedance to blood flow persists.[1-3] Theoretically, a pathological increase in placental vascular resistance should be detectable by abnormal Doppler flow studies of the maternal uterine vessels, and this could offers the potential to detect women at risk for diseases like preeclampsia.[4]

Preeclampsia, a pregnancy disorder, is defined as a systemic syndrome characterized by new-onset of hypertension (blood pressure – systolic > 140 mm Hg, diastolic > 90 mm Hg on two occasions at least 4 h apart, or in severe cases systolic blood pressure > 160 mm Hg and diastolic blood pressure > 110 mm Hg) and proteinuria (protein [mg]/ creatinine [mg] ratio of > 0.3 or protein > 5 g in a 24 h urine sample, or > 3 g in two samples taken 6 h apart from a patient on bed rest) after 20 weeks of gestational age in pregnant women, which resolves before the end of 6th week postpartum.[2-5]

Uterine artery Doppler ultrasonography may be performed via the transvaginal or transabdominal route in the first or second trimester. Uterine artery waveforms are reported to be readily obtainable in more than 95% of patients. The uterine artery is identified with the use of colour Doppler ultrasonography. Pulsed-wave Doppler ultrasonography is then used to obtain waveforms. Various indices can be calculated and assessed.[6,7]

Hence; the present study was conducted for assessing the role of Colour Doppler values as predictors of preeclampsia in 18-24 weeks of gestation.

MATERIALS & METHODS

The present study was conducted in the department of radio-diagnosis and it included assessment of colour Doppler values as a predictor of preeclampsia in 18-24 weeks of gestation. Ethical approval was obtained from institutional ethical committee and written consent was obtained from all the patients after explaining in detail the entire research protocol. A total of 25 patients with gestational age between 18 weeks to 24 weeks were enrolled in the present study. Complete demographic details of all the patients were obtained. Complete clinical examination of all the patients was carried out. Colour Doppler was carried out in all the patients. Patients were followed up to delivery and examination of the neonate was done.

True incidence of pre-eclampsia was assessed and was compared with colour Doppler findings. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software.

RESULTS

In the present study, a total of 25 patients were analysed. Mean gestational age was found to be 19.7 weeks, while mean age was found to be 23.8 years. In the present study, pre-eclampsia was found to be present in 4 patients (16 percentages of patients). However; Doppler findings were found to be abnormal in 4 patients, while it was found to be abnormal in 21 patients. Out of 4 patients with abnormal Doppler findings, pre-eclampsia was found to be present in 2 patients, while it was found to be absent in 2 patients.

Table 1: Gestational age

Gestational age (weeks)	Number of cases	Percentage of cases
18 to 20	14	56
21 to 24	11	44
Total	25	100

Table 2: Age-wise distribution of patients

Age group (years)	Number of patients	Percentage of patients
Less than 22	6	24
22 to 27	12	48
More than 27	7	28
Total	25	100

Table 3: Incidence of Pre-eclampsia

Pre-eclampsia	Number of patients	Percentage of patients
Present	4	16
Absent	21	84
Total	25	100

Table 4: Doppler findings

Pre-eclampsia	Doppler findings		Total
	Doppler Normal findings	Doppler abnormal findings	
Negative	19	2	21
Positive	2	2	4
Total	21	4	25

Graph 4: Doppler findings
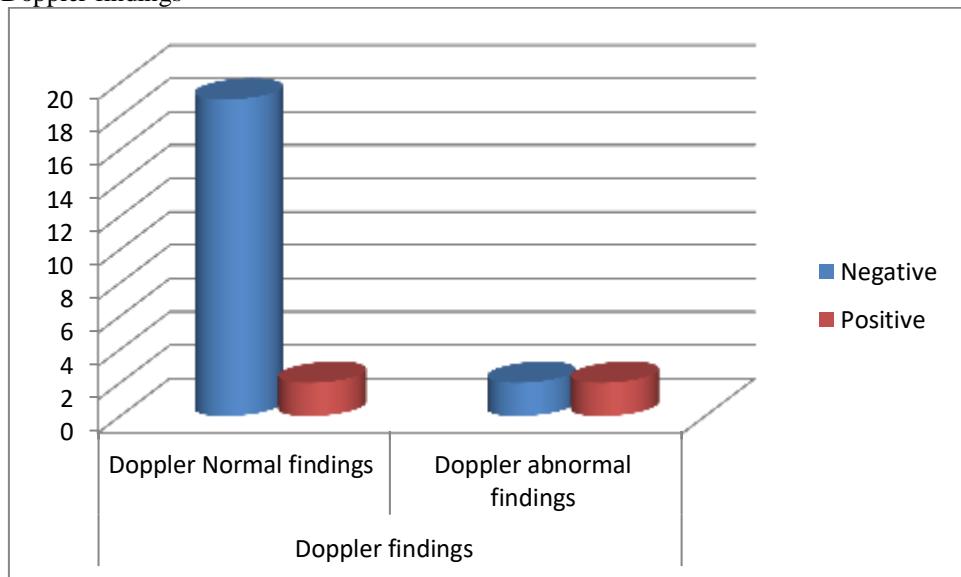
DISCUSSION

The best screening tests have to be accessible, available and relatively inexpensive. They must also provide reproducible results and be acceptable to patients. Uterine artery Doppler ultrasonography fulfils these criteria and is relatively easy to perform with training and experience. According to Cnossen and colleagues' findings, this procedure could be done in conjunction with routine anatomy ultrasonography at 18–20 weeks' gestation. Also, abnormal uterine artery Doppler studies in both the first and second trimester have been shown to be associated with subsequent perinatal complications.[8, 9] Hence; the present study was conducted for assessing the role of Colour Doppler values as predictors of preeclampsia in 18-24 weeks of gestation.

In the present study, a total of 25 patients were analysed. Mean gestational age was found to be 19.7 weeks, while mean age was found to be 23.8 years. Padmalatha VV et al presented experiences in the use of Doppler during the second trimester of women attending a multispecialty hospital in the outskirts of Bangalore city in Karnataka state, India. They concluded that combination of parameters is the best indicator for prediction of Pre-eclampsia and fetal growth restriction. Diastolic notch in the uterine artery as a single parameter is better than the individual Doppler indices. Increased impedance to uterine artery flow in both high risk and low risk pregnancies is associated with the risk for subsequent development of Pre-eclampsia and fetal growth restriction and it is a better predictor for high-risk patients.[10]

In the present study, pre-eclampsia was found to be present in 4 patients (16 percentages of patients). However; Doppler findings were found to be abnormal in 4 patients, while it was found to be abnormal in 21 patients. Out of 4 patients with abnormal Doppler findings, pre-eclampsia was found to be present in 2 patients, while it was found to be

absent in 2 patients. Razieh DF et al in a previous study evaluated the predictive value of Doppler investigations of the uterine circulations during 14-16 weeks of gestation with regard to the development of preeclampsia and/or IUGR in study population. This prospective observational study was carried out at university hospital. All 456 pregnant women referred to hospital from October 2011 to october2012, ultrasound sonography was done at 14-16 weeks of gestation. In all Doppler measurements, the mean peak systolic (S) to end-diastolic (D) ratio of 3-5 cardiac cycle was computed by electronic capilers and the RI calculated as (S-D/S). A total of 456 pregnant women with mean age of 26.8±5.3 years were recruited during the study. The uterine artery RI at 14-16 weeks was significantly higher in 27 women subsequently developed preeclampsia (mean RI=0.7526±0.039) than in 429 pregnancy with a normal outcomes (mean RI=0.6440±0.059, P=0.001).The uterine artery RI also was significantly higher in 36 women developed IUGR (RI=0.7244±0.04730) compared with 420 women with normal pregnancies (RI=0.6505±0.06043, P=0.001). RI=0.69 to predict preeclampsia and RI=o.7 to predict IUGR as mentioned are optional cut-off value for RI of the uterine artery in their study which were congruent with other studies.[11] In a previous study conducted by Woschitz MC et al evaluated the prognostic role of uterine artery Doppler for pre-eclampsia in high-risk patients. Because of the higher prevalence of new onset of disease in a high-risk population, a better performance could be expected in this special group. This retrospective study compares uterine artery Doppler to predict pre-eclampsia in patients with a history of pre-eclampsia and also in patients with chronic hypertension, both with high-risk to develop recurrent, superimposed or new onset pre eclampsia. Doppler measurements of uterine arteries were performed every 4 weeks in the

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1st and 2nd trimester. Pre-eclampsia occured in 33% of current high-risk pregnancies. The best performance of pre eclampsia was provided by bilateral notching plus increased PI ≥ 2.5, both in the 1st and 2nd trimester. In the 1st trimester the specifity was 81% (95% CI: 58-95) in the Prior PE group and 95% (95% CI: 74-100) in the C. H. group. In the 2nd trimester the sensitivity was 97% (95% CI: 86-100) in the Prior PE group and 100% (95% CI: 93 100) in the C. H. group. Sensitivity was very low in the 1st and 2nd trimester. Their results showed, that the negative predictive value of uterine artery Doppler works well even in a high risk group.[12]

CONCLUSION

From the above results, the authors conclude that by identification of the high risk patients & anticipating preeclampsia patients, close monitoring can be done to reduce the morbidity and improve the outcome of pregnancy.

REFERENCES

1. Giordano R, Cacciatore A, Romano M, La Rosa B, Fonti I, Vigna R. Uterine artery Doppler flow studies in obstetric practice. J Prenat Med. 2010;4(4):59–62.
2. Carty DM, Delles C, Dominiczak AF. Preeclampsia and future maternal health. J Hypertens. 2010;28:1349–1355.
3. Malik A, Jee B, Gupta SK. Preeclampsia: Disease biology and burden, its management strategies with reference to India. Pregnancy Hypertens. 2019 Jan;15:23-31.
4. Phipps E, Prasanna D, Brima W, Jim B. Preeclampsia: Updates in Pathogenesis, Definitions, and Guidelines. *Clin J Am Soc Nephrol.* 2016;11(6):1102–1113.
5. Sharma D, Shastri S, Sharma P. Intrauterine Growth Restriction: Antenatal and Postnatal Aspects. Clin Med Insights Pediatr. 2016;10:67–83.
6. Papageorghiou AT, Yu CK, Nicolaides KH. The role of uterine artery Doppler in predicting adverse pregnancy outcome. Best Pract Res. Clin Obstet Gynaecol. 2004;18:383–96.
7. Spencer K, Yu CK, Cowans NJ, et al. Prediction of pregnancy complications by first trimester maternal serum PAPP-A and free beta-hCG and with second trimester uterine artery Doppler. Prenat Diagn 2005;25:949-53.
8. Papageorghiou AT, Yu CKH, Bindra R, et al. Multicentre 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.
9. Cnossen JS, Morris RK, ter Riet G, et al. Use of uterine artery Doppler ultrasonography to predict pre-eclampsia and intrauterine growth restriction: a systematic review and bivariable meta-analysis. CMAJ 2008;178:701-11.
10. Padmalatha VV, Rao PSS, Abraham s, Thomas A. Predicting Pre-Eclampsia & Fetal Growth Restriction through Second Trimester Uterine Artery Doppler Sonography: An Indian experience. IOSR Journal of Dental and Medical Sciences (IOSR-JDMS). Volume 12, Issue 1 (Nov.- Dec. 2013), PP 21-26.
11. Razieh DF, Mahdyeh M, Saedeh A, Reza NM. Uterine Artery Doppler Sonography in Predicting Preeclampsia and IUGR at 14-16 Week Gestation. World Applied Sciences Journal 22 (2): 197-201, 2013
12. Woschitz MC, Idris T, Csapo B, Haas J, Ulrich D, et al. (2014) Uterine Artery Doppler in Women with History of Previous Pre Eclampsia and Women with Chronic Hypertension: Re-evaluation of a Prognostic Value in a High-Risk Population. Gynecol Obstet (Sunnyvale) 4:206. doi: 10.4172/2161-0932.1000206