International Journal of Medical Research Professionals
P-ISSN: 2454-6356; E-ISSN: 2454-6364
DOI: 10.21276/ijmrp

IJMRP

Original Research Article

Evaluation of Role of Doppler Ultrasound in High Risk Pregnancy: An Institutional Based Study

Bhawna Kansal[1], Ashu Jain[2*], Alka Garg[3]

[1]Assistant Professor, Department of Obstetrics & Gynaecology, Subharti Medical College, SVSU, Meerut, Uttar Pradesh, India.
[2]Associate Professor, Department of Obstetrics & Gynaecology, Venkateshwara Institute of Medical Sciences, Gajraula, Amroha, Uttar Pradesh, India.
[3]Associate Professor, Department of Obstetrics & Gynaecology, Rama Medical College Hospital & Research Centre, Hapur, Uttar Pradesh, India.

ABSTRACT

Background: Doppler technique is a non-invasive technique to study the uteroplacental fetal inoculations and it is simple, safe and reproducible gives more accurate examinations. The present study was conducted to find the role of Doppler ultrasound in high risk pregnancy.

Materials and Methods: The present study was conducted among 240 women at Department of Obstetrics & Gynaecology, Subharti Medical College, SVSU, Meerut, Uttar Pradesh, India. Women were randomized divided into two groups. Group A i.e. to have Doppler ultrasound or group B i.e. not to have Doppler ultrasound. The participants of group A were subjected to receive waveform studies at the time of first visit followed by successive examinations by Doppler studies. Gestational age was assessed using the last normal menstrual period. Data were analyzed using SPSS (SPSS Inc., Chicago, IL, USA). The data was subjected to descriptive analysis. p level of <0.05 was considered as significant.

Results: In the present study total women were 240 who were divided into two groups i.e Group A and Group B. In group A maximum women were of age group >35 years (45%) and in Group B maximum women were of age group >35 years (38.33%). Amniotic fluid was poly/oligohydramnios in 65% women in group A and in 30.83% in group B. Labor induction occur in 17.5% women in group A and in 8.33% in group B. Caesarean section was given in 67.5% women in group A and 65% in group B. In 64.16% women of group A Gestational age was normal and in Group B 73.33% women gestational age was normal. Placenta was in abnormal location in 8.33% women in group A and 6.66% in group B. Calcified placenta was present in 1.66% women in Group A and 0% in group B.

Conclusion: Our study concluded that the positive predictive value for assessment of fetal Doppler ultrasound has revolutionized the diagnosis of abnormal and early identification of these pregnancies are useful in the determining the optimal time for delivery to reduce the perinatal mortality.

Keywords: Amniotic Fluid, Gestational Age, Caesarean Section, Doppler Ultrasound.

***Correspondence to:**

Dr. Ashu Jain,
Associate Professor,
Department of Obstetrics & Gynaecology,
Venkateshwara Institute of Medical Sciences,
Gajraula, Amroha, Uttar Pradesh, India.

Article History:

Received: 10-12-2016, **Revised:** 03-01-2017, **Accepted:** 22-01-2017

Access this article online	
Website: www.ijmrp.com	Quick Response code
DOI: 10.21276/ijmrp.2017.3.1.068	

INTRODUCTION

Doppler techniques have been the focus of interest and research activity in obstetrics since the initial report of signals from the umbilical artery by Fitzgerald and Drumm.[1] The first application of Doppler velocimetry in obstetrics was reported by Fitzgerald and Drumm[1] and McCallum et al.[2] Doppler ultrasound technology evaluates umbilical artery (and other fetal arteries) waveforms to assess fetal well-being in the third trimester of pregnancy. It is widely used in high-risk pregnancies to identify fetal compromise and thus reduce perinatal mortality.[3,4]

The significance of Doppler ultrasound in evaluating pregnancies that have the risk for preeclampsia, intrauterine growth restriction, fetal anaemia, and umbilical cord abnormalities has become indispensable. Recent findings aided in timing delivery of severely growth-restricted fetuses by promoting the use of ductus venosus Doppler.[5] The result is abnormal uteroplacental blood flow, and this has led to the idea of using Doppler assessment of uterine and umbilical arteries velocity waveforms as a method of screening for these antenatal complications. An abnormal test

result is represented by an abnormal flow velocity ratio (systolic/diastolic (S/D) ratio), resistant index, or the presence of an early diastolic notch.[6,7] Advantage of color Doppler flow velocimetry is the early diagnosis of Intrauterine growth restriction which can reduce the fetal morbidity and mortality.[8,9] Hence, the present study was conducted to find the role of Doppler ultrasound in high risk pregnancy.

MATERIALS AND METHODS

The present study was conducted among 240 women at Department of Obstetrics & Gynaecology, Subharti Medical College, SVSU, Meerut, Uttar Pradesh, India. Before the commencement of the study ethical approval was taken from the Ethical Committee of the institute and written formal informed consent from all participants was taken after they had been made aware of the study procedure. Females with viable singleton pregnancy with regular antenatal visits and gestational age 28 or more weeks, females with high-risk pregnancy (with diabetes, cancer, high blood pressure, kidney disease, epilepsy, past history of three or more miscarriages, preterm delivery, preeclampsia or seizures, heart valve problems, asthma, and rheumatoid arthritis) were also included. Pregnant women with multiple pregnancies, fetus with congenital abnormality, and smoking history of mother were excluded from the study. Women were randomized divided into two groups. Group A i.e. to have Doppler ultrasound or group B i.e. not to have Doppler ultrasound. The participants of group A were subjected to receive waveform studies at the time of first visit followed by successive examinations by Doppler studies. Doppler flow velocity waveform studies were performed with a continuous wave system. The participants were supine with lateral tilt provided by a wedge under one hip. The ratio of peak systolic (S) to least diastolic (D) Doppler shift frequency was calculated from waveforms obtained from an umbilical artery and from a maternal utero-placental artery within the placental bed. These ratios were not adjusted to standard fetal or maternal heart rates. The obstetrician in charge of each case was also informed about the result which was outside the reference range. Gestational age was assessed using the last normal menstrual period if women sure of date and had regular cycle and also assessed by an ultrasound performed before 24 weeks gestation. If the dates differed from the ultrasound by more than 2 weeks, the ultrasound was used as the measure of gestational age. Antenatal fetal heart rate (FHR) monitoring recordings if any distress observed the subject was subjected for immediate delivery. If the patient was randomized to group A and Doppler was normal, no intervention was done according to the protocol. Group B which was Doppler not done for them must be managed according to high-risk clinical problems and our standard protocol. Sonar and fetal heart rate monitoring was available to all patients. Data were analyzed using SPSS (SPSS Inc., Chicago, IL, USA). The data was subjected to descriptive analysis. The chi-square test was applied to categorical variables. Student's *t*-test was applied to continuous data. p level of <0.05 was considered as significant.

RESULTS

In the present study total women were 240 who were divided into two groups i.e Group A and Group B. In group A maximum women were of age group >35 years (45%) and in Group B maximum women were of age group >35 years (38.33%). Amniotic fluid was poly/oligohydramnios in 65% women in group A and in 30.83% in group B. Labor induction occur in 17.5% women in group A and in 8.33% in group B. Caesarean section was given in 67.5% women in group A and 65% in group B. In 64.16% women of group A Gestational age was normal and in Group B 73.33% women gestational age was normal. Placenta was in abnormal location in 8.33% women in group A and 6.66% in group B. Calcified placenta was present in 1.66% women in Group A and 0% in group B.

Table 1: Distribution according to gender

Age group	Group A n (%)	Group B n (%)
<25 years	21(17.5%)	32(26.66%)
25-35 years	45(37.5%)	42(35%)
>35 years	54(45%)	46(38.33%)
Total	120 (100%)	120(100%)

Table 2: Maternal and fetal clinical profile and outcome

Variables	Group A n (%)	Group B n (%)	p value
Amniotic fluid			<0.05
Normal	42(35%)	83(69.16%)	
Poly/oligohydramnios	78(65%)	37(30.83%)	
Labor induction			
Yes	21(17.5%)	10(8.33%)	
Mode of delivery			
C- section	81(67.5%)	78(65%)	
Gestational age			
Pre-term	43(35.83%)	32(26.66%)	
Normal	77(64.16%)	88(73.33%)	
Placenta			
Abnormal location	10(8.33%)	8(6.66%)	
Calcification	2(1.66%)	0(0%)	

DISCUSSION

Doppler ultrasound is useful for distinguishing between fetuses that are growth-restricted (IUGR) and those that are constitutionally small (SGA).[10] It can be performed as part of a fetal ultrasound examination or separately. The examination quantifies blood flow through the umbilical artery as either a pulsatility index or a resistive index.[11]

In the present study total women were 240 who were divided into two groups i.e Group A and Group B. In group A maximum women were of age group >35 years (45%) and in Group B maximum women were of age group >35 years (38.33%). Amniotic fluid was poly/oligohydramnios in 65% women in group A and in 30.83% in group B. Labor induction occur in 17.5% women in group A and in 8.33% in group B. Caesarean section was given in 67.5% women in group A and 65% in group B. In 64.16% women of group A Gestational age was normal and in Group B 73.33% women gestational age was normal. Placenta was in abnormal location in 8.33% women in group A and 6.66% in group B. Calcified placenta was present in 1.66% women in Group A and 0% in group B.

Trudinger et al. randomized 300 high risk pregnant females into two groups, i.e. a group for antenatal Doppler umbilical artery waveform studies and a control group, and found no difference in the rates for elective delivery in the two groups, whereas among those who went into labor (induced or spontaneous) emergency caesarean section was more frequent in the control group (23%) than those in the report group (13%). The findings indicated that the availability of Doppler studies leads to better obstetrical decision making.[12]

Jain et al. Study inducted assessment of IUGR by clinical fetal monitoring and ultrasonography in 100 cases. Incidence of IUGR was 57% in risk cases and 18.38% in without risk cases. Maximum % was found in primigravidae. IUGR appeared suddenly in the 3rd trimester APH, severe anemia toxemia of pregnancy carried the highest risk for IUGR.[13]

McParland and Pearce described in a review article the results of a study of 509 pregnancies in which patients were stratified into “concealed” or “revealed” groups according to whether the waveforms were normal or abnormal. Fewer neonatal deaths were observed in the “revealed” group although further details were not provided.[14]

In a study done by Kirkinen P et al. found that blood flow velocity waveforms were recorded by pulsed Doppler examination from fetal intracranial arteries in 83 normal and 84 high-risk pregnancies. The normal cases showed a decreasing resistance index of the waveform toward the end of pregnancy, and a continuous forward flow that was always present in these arteries. A low resistance index predicted the birth of a small-for-dates newborn and/or the appearance of subsequent cardiotocographic abnormality, with 57% sensitivity and 94% specificity[15]

CONCLUSION

Our study concluded that the positive predictive value for assessment of fetal Doppler ultrasound has revolutionized the diagnosis of abnormal and early identification of these pregnancies are useful in the determining the optimal time for delivery to reduce the perinatal mortality.

REFERENCES

1. Fitzgerald D.E., Drumm, J.E. Non-invasive measurement of the foetal circulation using ultrasound: a new method. Br Med J. 1977; 2: 1450–51.

2. McCallum, W.D., Olson, R.F., Daigle, R.E., Baker, D.W. Real time analysis of Doppler signals obtained from the fetoplacental circulation. Ultrasound Med. 1977; 3B: 1361–4.

3. Maulik D, Mundy D, Heitmann E, Maulik D. Evidence-based approach to umbilical artery Doppler fetal surveillance in high risk pregnancies: an update. Clin Obstet Gynecol. 2010;53(4):869–78. doi:10.1097/ GRF.0b013e3181fbb5f5.

4. Alfirevic Z, Stampalija T, Gyte GML. Fetal and umbilical Doppler ultrasound in high-risk pregnancies. Cochrane Database Syst Rev. 2013;(11):CD007529.

5. Hoffman C, Galan HL. Assessing the ‘at-risk’ fetus: Doppler ultrasound. Curr Opin Obstet Gynecol. 2009; 21:161–6.

6. Polat, I., Gedikbasi, A., Kiyak, H. Double notches: association of uterine artery notch forms with pregnancy outcome and severity of preeclampsia. Hypertens Pregnancy. 2015; 34(1): 90–101.

7. Newnham, J.P., Patterson, L.L., James, I.R., Diepeveen, D.A. An evaluation of the efficacy of Doppler flow velocity analysis as a screening test in pregnancy. Am J Obstet Gynecol. 1990;162:403–10.

8. Campbell S, Griffin D, Pearce JM. New Doppler technique for assessing uteroplacental blood flow. Lancet 1983;1: 675-7.

9. Trudiger BJ, Giles WB, Cook CM, Bom- bardieri J, Collins L. Fetal umbilical artery flow velocity waveforms and placental resistance: clinical significance. Br J Obstet Gynecol 1985;92: 23-30.

10. Soothill PW, Ajayi RA, Campbell S, Nicolaides KH. Prediction of morbidity in small and normally grown fetuses by fetal heart rate variability, biophysical profile score and umbilical artery Doppler studies. Brit J Obstet Gynaecol. 1993; 100:742–5.

11. Alfirevic Z, Stampalija T, Medley N. Fetal and umbilical Doppler ultrasound in normal pregnancy. Cochrane Database Syst Rev. 2015;(4):CD001450.

12. Trudinger BJ, Cook CM, Giles WB, Corrrelly A, Thompson RS. Umbilical artery flow velocity waveforms in high-risk pregnancy-randomized controlled trial. Lancet. 1987; 1:188–90.

13. Jain A, Kumar G, Agarwal U, et al. Placental thickness: a sonographic indicator of gestational age. J Obst Gynae India. 2001; 51:48–9.

14. McParland P, Pearce JM. Doppler blood flow in pregnancy. Placenta. 1988; 9:427–50.

15. Kirkinen P, Muller R, Huch R, Huch A. Blood flow velocity waveform in human fetal intracranial arteries. Obstet Gynecol 1987;70: 617-21.

Source of Support: Nil. **Conflict of Interest:** None Declared.

Cite this article as: Bhawna Kansal, Ashu Jain, Alka Garg. Evaluation of Role of Doppler Ultrasound in High Risk Pregnancy: An Institutional Based Study. Int J Med Res Prof. 2017; 3(1): 324-26.
DOI: 10.21276/ijmrp.2017.3.1.068