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COMPARISON OF BIOPHYSICAL PROFILE AND DOPPLER ULTRASOUND IN PREDICTING THE PERINATAL OUTCOME IN HIGH RISK PREGNANCIES AT OR OVER 34 WEEKS GESTATION

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ABSTRACT

OBJECTIVE: Objective of the study is to compare biophysical profile and doppler ultra sonographic analysis, to predict which is more useful in diagnosis in high risk pregnant women at or over 34 weeks gestation.

METHODS: This is a prospective comparative study done at a tertiary hospital attached to RVM Medical College, Siddipet on 100 antenatal women with high risk factors at or over 34 weeks. The risk factors included in the study were Hypertensive disorder of pregnancy, Intrauterine Growth Restriction, Post datism, Bad Obstetric History, Rh-negative pregnancy and Diabetes. Antenatal women below 34 weeks gestational age, those who are in active labor and without any risk factors were excluded from the study. In the test group women a detailed history, examination and a baseline ultrasound was done. Both Biophysical Profile and Doppler studies are conducted for every case and are followed up to the delivery and the perinatal outcome noticed.

RESULTS: Risk factors in majority of patients are pre eclamptic toxemia group(45%) followed by IUGR (20 %) , BOH(10%), Rh Negative pregnancy (10%), post datism(10%) and diabetes complicating pregnancies(5%). Most of the women were primigravidas(62%) and were in the age group 26 -30years (46%). 40% had abnormal BPP and 34% had abnormal Doppler study. Most of them (51%) were delivered by vaginal route. The Doppler analysis was normal in 66 members and abnormal in 34 members. The perinatal outcome of the group with normal BPP and normal Doppler was better and the data was statistically significant ($p < 0.001$). The Doppler velocimetry had high sensitivity, specificity and negative predictive value than Biophysical profile.

CONCLUSION: In prediction of perinatal outcome in high risk women at or above 34 weeks gestation, the Doppler velocimetry had more sensitivity, specificity and negative predictive values than Biophysical profile. The predictive value of Doppler was increased when combined with Biophysical profile and was beneficial in perinatal prediction.

KEYWORDS : Biophysical profile, Doppler ultrasound, Perinatal outcome

BACKGROUND

Pregnancy as a high-risk event was first recognized in 1901 by Ballantyne1 in his paper titled "A plea for pre-maternity hospital". A healthy newborn is the goal of every expectant mother and her physician. Perinatal mortality is high in developing countries like India more so in rural areas.

Antepartum foetal surveillance is the corner stone of mana gement aimed at reducing maternal and perinatal mortality and morbidity. Hence, the requirement of identification of high-risk pregnancies and their proper management is a must, which is obvious with the theme of 2005 on world health day "Every mother & child count".[2]

Obstetricians have long searched for methods of antepartum fetal evaluation that would be non-invasive and accurate and yield results that were immediately available. Ultrasound has revolutionized the antepartum foetal assessment as a whole. The incorporation of Doppler derived hemodynamic information into the sonographic assessment allows the additional evolution of a variety of physiologic parameters in obstetrics.

OBJECTIVES:

The objective of the study is to compare biophysical profile and doppler ultra sonographic analysis, to predict which is more useful in diagnosis and there by prevention of intrauterine complications in high risk pregnant women at or over 34 weeks gestation.

MATERIALS AND METHODS:

The study was conducted at a tertiary hospital attached to RVM Medical College, Siddipet. In this prospective comparitive study, 100 antenatal women with high risk factors at or over 34 weeks are selected.

Inclusion criteria:

All antenatal woman at or over 34 weeks of gestational age with high risk pregnancies such as Preeclampsia, Bad Obstetric History, Postdatism, Intrauterine Growth Restriction, Diabetes and Rh negative pregnancy are included in the study.

Exclusion criteria:

1.Antenatal women below 34 weeks gestational age.
2.Antenatal women without risk factors.
3.Antenatal women in active labour.

In the test group patients, a detailed history and consent was taken. The risk factor for which the patient was included in the test group was noted. A thorough clinical examination was made at admission. A detailed systemic and obstetric examination was done. All preliminary investigations were made as out lined in the proforma and a baseline ultrasound scanning was done using Philips HD7 XE BOTHELL WA, USA equipped with 3.5MHz curvilinear transducer. Both Biophysical Profile and Doppler studies are conducted for every case and are followed up to the delivery and the perinatal outcome noticed.

The Biophysical Profile consisting of the Non - Stress Test recording for a period of 20 minutes, followed by Amniotic Fluid volume measurement using vertical pocket method. Fetal breathing movements (30seconds of sustained breathing movement during 30 minutes observation), fetal movements (3 or more gross movements), fetal tone (one or more episodes of active extension with return to flexion of limbs or trunk). The test was initiated at 34 weeks of Gestation or later at which risk factor was identified. The test was repeated weekly or bi-weekly or daily depending on severity of the risk factor. In the present study BPP score of ≤6 is taken as abnormal BPP.

Doppler analysis was carefully performed after gaining atleast three velocity wave forms the period of no respiration and no movement of the fetus. In Doppler Analysis the following were evaluated as pathological findings:

1.S/D ratio of at least one of the uterine arteries of more than 2.6
2.Presence of notches, difference between S/D ratio of uterine

arteries being above 1
3. S/D ratio of umbilical artery of more than 3.6
4.Absent end diastolic velocity(AEDV) or Reversed end diastolic velocity
5.P.I of middle cerebral arteries more than 1.3.

Delivery was prompted if the test results were abnormal. Either a spontaneous labour awaited or labour induced depending on gestational age and Bishop's score. The details of the delivery viz., Induced or spontaneous, vaginal or operative and the indication for the same were noted. The details of intrapartum monitoring, the color of liquor, and the outcome details like APGAR, birth weight, need for resuscitation and NICU admission and condition at discharge were noted down.

The statistical analysis of the study was performed using the Chi-square method. p value of <0.05 was considered significant.

RESULTS

Total number of patients studied was 100. Both Biophysical Profile and Doppler ultrasound tests were conducted for every case.

FIGURE I : NUMBER OF PATIENTS WITH EACH RISK FACTOR

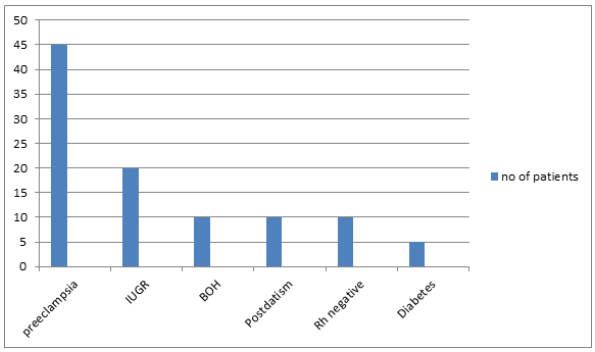


FIGURE 2: GRAVIDA AND GESTATIONAL AGE DISTRIBUTION

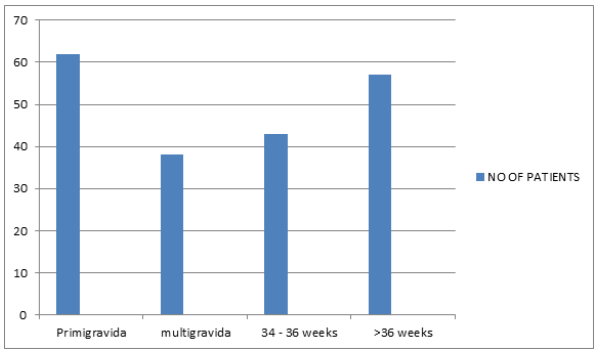


FIGURE 3: AGE DISTRIBUTION

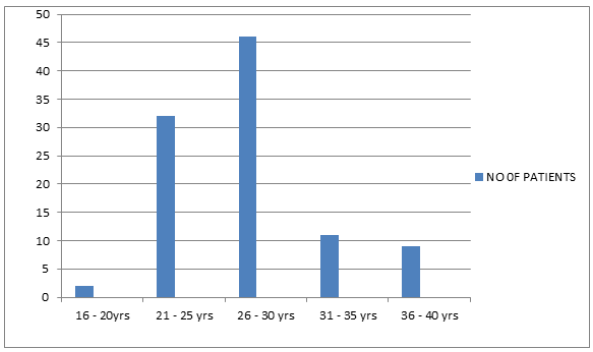
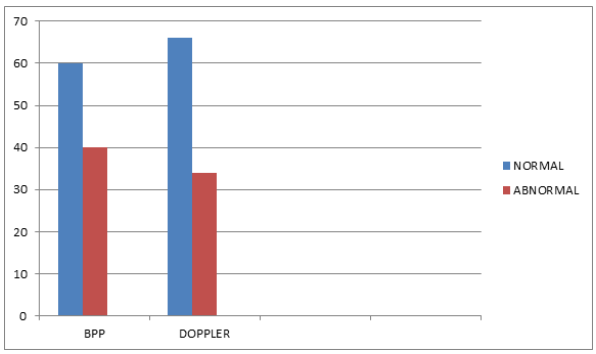
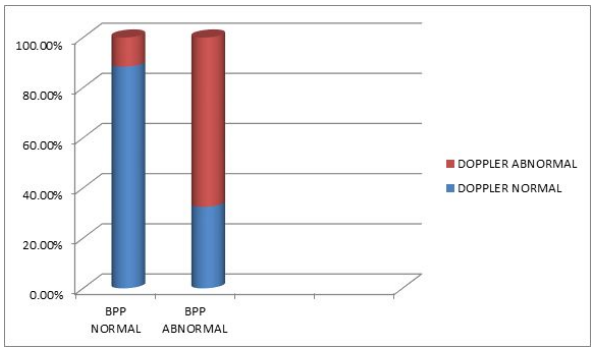


FIGURE 4 : RESULTS OF APPLIED TESTS (BPP AND DOPPLER)



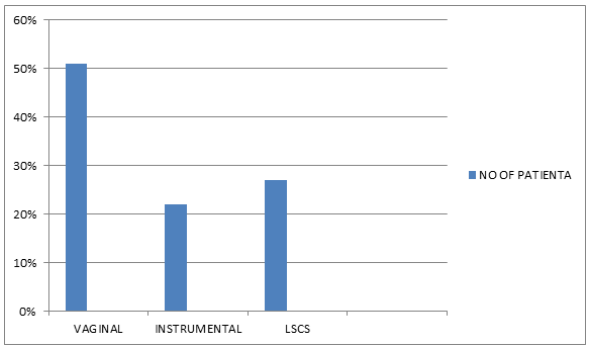
Out of 100 patients 40% are having abnormal BPP and 34% are having abnormal Doppler study.

5 : CLUSTER ANALYSIS OF APPLIED TESTS (DOPPLER AND BPP)



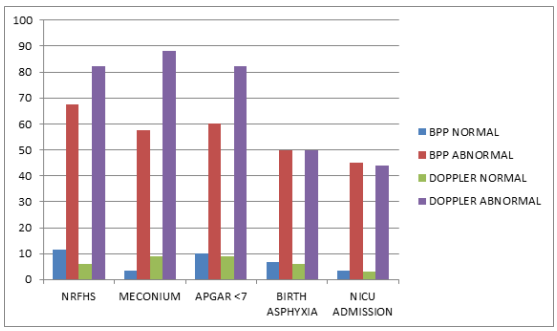
Out of 60 patients with normal BPP, Doppler study is normal in 88.4% and abnormal in 11.6%. Out of 40 patients with abnormal BPP, Doppler study is normal in 32.5% and abnormal in 67.5%.

FIGURE 6 : MODE OF DELIVERY



Out of 100 patients, 51% were delivered by vaginal route, 22% by instrumental delivery and the remaining 27% by LSCS.

FIGURE 7: RELATION BETWEEN PERINATAL OUTCOME AND APPLIED TESTS



Out of 40 patients with abnormal BPP, NRFHS 67.5%, meconium

57.5%, APGAR<7 60%, Birth Asphyxia 50%, admission in NICU 45%. Out of 60 patients with normal BPP, NRFHS 11.67%, meconium 3.3%, APGAR<7 10%, Birth Asphyxia 6.7%, admission in NICU 3.3%.The perinatal outcome of the group with normal BPP was better and the data was statistically significant ($p < 0.001$).

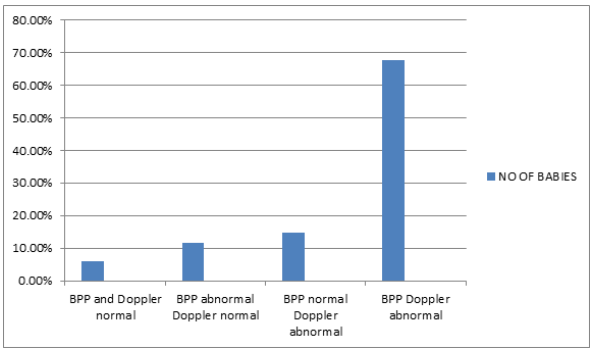
Out of 60 patients with normal Doppler, NRFHS 6%, meconium 9%, APGAR <7 9%, birth asphyxia 6%, admission in NICU 3%. Out of 40 patients with abnormal Doppler, NRFHS 82.4%, meconium 88.2%, APGAR <7 82.4%, birth asphyxia 50% and admission in NICU 44.1%. The perinatal outcome of the group with normal Doppler analysis was better and the data was statistically significant ($p <0.001$).

TABLE 1: TEST PERFORMANCE OF APPLIED TESTS

APPLIED TEST	SENSITIVITY	SPECIFICITY	POSITIVE PREDICTIVE VALUE	NEGATIVE PREDICTIVE VALUE
BPP	79.4%	80.3%	67.5%	88.3%
DOPPLER	83.3%	93.7%	88.2%	90.9%

In the present study the Doppler has high sensitivity, specificity and positive and negative predictive values than Biophysical profile.

FIGURE 8: COMPARISON OF ABNORMAL PERINATAL OUTCOME IN APPLIED TESTS



Both applied tests i.e abnormal BPP and abnormal Doppler have combined positive predictive value of 85.2% in abnormal perinatal outcome. Abnormal Doppler has predictive value of 82.4% and abnormal BPP has a predictive value of 79.3% in abnormal perinatal outcome.

DISCUSSION

The present study aims at identifying the high risk pregnancies at an earlier stage so that extra vigilance is provided while treating them in order to have a fruitful outcome. The study utilises Biophysical profile and Doppler Ultrasound in high risk pregnancies to identify the compromised foetuses.

In patients with BPP score < 6, 57.5% cases had meconium stained liquor and 50% cases had birth asphyxia. In Manning et al study[3] 75% patient had fetal distress with BPP < 6 but only 21.2% cases had meconium stained liquor. This shows significant fetal hypoxia with low BPP score. In this present study birth asphyxia was 50% among the BPP < 6 is nearer to that of the above study.

In the present study the incidence of NRFHS was 82.3% in the pathological Doppler findings and 6% in the normal Doppler group similar to Feinkind et al[5] and Fairlie et al[4] study.

The S/D ratio of the umbilical artery was normal in 66 pregnant women and abnormal in 34. Those with a normal umbilical S/D ratio had better perinatal outcome. This was proven to be statistically significant (<0.001) similar to Jensen and Guimaraes[6] study, who found a significant relation between S/D ratio, intrauterine growth retardation and admission to NICU. A strict correlation was found between abnormal umbilical Doppler velocimetry and increased incidence of perinatal complications in Soregaroli M et al[7] study. It was concluded that umbilical artery Doppler velocimetry is a useful tool to assess fetal well being in hypertensive pregnancies in Pere–Joan Torres study[8].

Both applied tests i.e abnormal BPP and abnormal Doppler have combined predictive value of 85.2% in abnormal perinatal outcome nearer to that of Turan et al[9] study who stated that using two or more antenatal tests is more beneficial in prediction of fetal acidosis than using a single test.

Deka D study[10] concluded that color Doppler was abnormal before the evidence of biophysical profile abnormality by several days to weeks, so Doppler is more sensitive than biophysical profile in high risk pregnancies. The present study also proved that Doppler velocimetry is more sensitive than biophysical profile in high risk pregnancy.

CONCLUSION

In prediction of perinatal outcome in high risk women at or above 34 weeks gestation, the Doppler velocimetry had more sensitivity, specificity and negative predictive values than Biophysical profile. Biophysical profile is having less predictive value, more time consuming and requires more skills from sonologist when compared to Doppler analysis. In predicting the perinatal outcome, Doppler was proven to be more significant diagnostic method than biophysical profile. The predictive value of Doppler was increased when combined with biophysical profile and was beneficial in perinatal prediction.

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