



## EFFICACY OF VIBROACOUSTIC STIMULATION AND MODIFIED BIOPHYSICAL PROFILE IN PREDICTING FETAL OUTCOME IN PERINATAL PERIOD – A PROSPECTIVE STUDY

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### ABSTRACT

**Background:** Perinatal period is the most crucial period in obstetric management and several diagnostic modalities are available to predict the fetal outcome in this period.

**Objective:** to evaluate the efficacy of Vibroacoustic Stimulation (VAS) and Modified Biophysical Profile (MBPP) in predicting fetal outcome.

**Methodology:** The present study was a prospective study of 100 cases of high risk pregnancy conducted over a period of 2 years from October 2011- October 2013, in The Department of Obstetrics and Gynaecology, at Alluri Sitaramaraju Academy of Medical Sciences, Eluru. The patients were evaluated with the VAS/modified biophysical profile consisting of VAS/NST followed by amniotic fluid index measurement using four quadrant technique. The test was initiated after 36 weeks of gestation who were in latent phase of labour with high risk factors included in the study.

**Results:** A large chunk of the study group was aged between 21-30 yr (73%). Just over half of the women in my study constituted multigravida (56%) i.e second gravida and above. Of the high risk factors included in my study, the incidence of hypertensive disorders of pregnancy was the highest (22%), followed by IUGR (20%), decreased fetal movements 18%, BOH (15%), postdates (14%), diabetes, hypothyroidism and heart disease constituted minority (11%) of the cases.

The incidence of abnormal NST was 15% and amniotic fluid index less than 5 was documented in 16%. VAS/MBPP was normal in 78% and abnormal in 22% of the patients. Meconium stained liquor was observed in 10% of cases. The incidence of APGAR score < 7 at 5 minutes was 15%. Total NICU admission >24 hrs i.e perinatal morbidity was 17%, the major contributor being meconium aspiration syndrome (41%), other factors leading to NICU admission were RDS (29%), hypoglycemia (11%), neonatal sepsis (11%) and hypoxic ischemic encephalopathy (5.8%). Out of 100 cases the no of babies that died were 3. Among them 2 deaths due to MAS and 1 death due to neonatal sepsis. VAS/MBPP had a high specificity (88%) and negative predictive value (93.5%) thus implying that it is a reliable diagnostic test for assessing fetal well being. As a negative or reactive test is unlikely to be associated with adverse perinatal outcome. On the other hand, a lesser sensitivity (70%) and positive predictive value (54.5%) imply that it is relatively less reliable as a screening test for identifying a compromised fetus and need further evaluation for confirming fetal compromise.

In terms of perinatal deaths it showed high sensitivity (100%) and high negative predictive value (100%). So it may be useful as a rapid admission test for fetal well being. VAS/MBPP was highly significant (P value < 0.05) for intrapartum fetal surveillance.

**Conclusion:** VAS and MBPP are reliable methods for predicting fetal outcome in perinatal period.

**KEYWORDS :** Fetal well being, Modified biophysical profile, Perinatal mortality, Vibroacoustic stimulation

### INTRODUCTION

The role of every obstetrician is, to be aware of the causes of perinatal mortality, the diagnostic aids available for fetal surveillance and their appropriate use in order to ensure the earliest possible detection of fetal jeopardy and timely institution of interventional measures for the improvement of perinatal outcome.

Perinatal period occupies less than 0.5% of the average life span and yet accounts for more deaths than in the next 30 years. This truly reflects the value of antenatal and intranatal care. It was estimated that 7.3 million perinatal deaths occur annually in the world, especially in Asia. In India, the perinatal mortality is 37.7/1000 births. It is higher in rural (54.4) than urban (32.4) areas. Where once upon a time, only intermittent auscultation of the fetal heart and subjective recording of fetal movements had to be relied upon, we now possess a complex array of genetic, biochemical and biophysical tests for fetal surveillance at our disposal. The advent of electronic fetal monitoring together with ultrasound had changed the topography of fetal surveillance. These tests have been extensively studied to find out their use in predicting fetal outcome<sup>1-5</sup>

In this study, modified biophysical profile along with VAS used as a primary surveillance test to study its effectiveness in predicting perinatal outcome

### OBJECTIVE

To evaluate the efficacy of Vibroacoustic Stimulation [VAS] and Modified Fetal Biophysical Profile for early intrapartum fetal assessment and prediction of adverse perinatal outcome

### MATERIALS AND METHODS

**Source of data:** This is a prospective study done in pregnant women attending the labour unit of the hospital, The Department of Obstetrics and Gynaecology, Alluri Sitaramaraju Academy of Medical Sciences, Eluru.

#### Inclusion criteria

Gestational age  $\geq$  36 wks, Singleton pregnancy, Cephalic presentation, Latest phase of labour (< 4 cm cervical dilatation), Preeclampsia, Anaemia, History of previous still births, IUGR, Heart disease complicating pregnancy, Diabetes mellitus / Gestational diabetes, Decreased fetal movements, Bad obstetric history,

#### Exclusion criteria

Fetuses with congenital anomalies, Multi fetal pregnancies, PROM, Malpresentations

After taking a written informed consent, patients were subjected to a detailed general physical and obstetric examination. In needed situations, pelvic examination was done to confirm the presentation,

position, Bishop's score and to assess the adequacy of pelvis. As per the individual case scenarios, delivery decision viz Vaginal / Caesarean section was made. Any risk factor associated was noted. The patients were evaluated with the modified biophysical profile consisting of VAS with NST recording, followed by amniotic fluid index measurement using four quadrant technique

## RESULTS AND DISCUSSION

In this prospective study conducted over a period of 2 years from October 2011 to October 2013, VAS and MBPP used for early intrapartum fetal surveillance to evaluate perinatal outcome.

**Booked Vs Unbooked :** 73% of the study group were booked and 27% were unbooked.

**Age Distribution :** 83% of women in my study belonged to the age group of 21-30 years (table 5), at the mean SD of 25.5yrs, which was similar to study by Eden et al and Sood Atul Kumar et al.

**Gravid status:** Most of the women in the study group constituted (56%) multigravida, most of whom were 2<sup>nd</sup> and 3<sup>rd</sup> gravida. The mean of gravid status was 2.2±1.4 SD which is closer to study by Eden et al<sup>1</sup>.

**Socioeconomic status:** The bulk of patients in the study group were of low socioeconomic status accounting for 75% (table 7).

**Risk factors Distribution:** The incidence of hypertensive disorders of pregnancy was 22% which was nearer to the studies conducted by Eden et al<sup>6</sup> and Sood Atul Kumar et al<sup>7</sup>. Primigravida constituted 44% in my study, as PIH common in primi, this may be the cause of 20% incidence of hypertensive disorders of pregnancy.

The incidence of IUGR in pregnancy was 20%, which coincides to the study conducted by Sood Atul Kumar et al. The high incidence of low socioeconomic status and hypertensive disorders of pregnancy, may be the cause of 20% IUGR incidence.

The incidence of decreased fetal movements in my study was 18%, which was close to the study by Jamal et al<sup>8</sup>. This may be due to oligohydramnios, which constituted 16%. Compared to the other studies, the incidence of BOH was considerably higher i.e 15%, may be due to inclusion of all high risk cases in the study. 14% incidence of postdated pregnancy in my study was close to the study by Sood Atul Kumar et al<sup>7</sup> and Jamal et al<sup>8</sup>. This explained by low socioeconomic status of majority patients and lack of awareness about EDD. There was similar incidence of diabetes in my study (6%), as well as the study by Nageotte et al<sup>9</sup> and Sood Atul Kumar et al<sup>7</sup>. The incidence of hypothyroidism was 4% which is higher than that in the study by Eden et al<sup>6</sup> as majority of the patients were of low socioeconomic status and belonged to tribal area. The incidence of heart disease complicating pregnancy was 1% which was similar to the study by Eden et al.

**NST Results :** The incidence of abnormal NST in the study was 15%, which was similar to the study by Nageotte et al<sup>9</sup> and comparatively higher to the studies by Eden et al<sup>6</sup>, Bardakci et al and Sood Atul Kumar et al<sup>7</sup>. This may be due to the inclusion of high risk cases in my study.

**AFI Results <5** The incidence of AFI <5 was 16% in the study. This correlates with studies by Nageotte et al (17%) and Bardakci et al (16.25%)

**Meconium stained liquor:** The incidence of meconium stained liquor was 10%, which was less compared to other studies, it may be because of continuous intrapartum fetal surveillance and timely intervention.

**Caesarean section rates:** The rate of Caesarian section was 30%, closer to the study by Jamal et al. This 30% incidence was explained by continuous intrapartum fetal surveillance and timely intervention.

**APGAR Score < 7:** The total incidence of APGAR score less than 7 was 15% in my study, which was closer to the study by Bardakci et al., and higher than other studies. This may be due to inclusion of all high risk cases in the study.

**Incidence of Perinatal Morbidity:** In my study the perinatal morbidity was 17%, higher than the study by Miller et al<sup>6</sup> and Sood Atul Kumar et al and lesser than other studies. Major contributing factor for morbidity was meconium aspiration and other factors were RDS, hypoglycemia, neonatal sepsis and HIE.

**Incidence of Perinatal Mortality:** The perinatal mortality in my study group was 3%, which was close to the study by Bardakci et al. There was no perinatal mortality in patients with normal MBPP. In patients with abnormal MBPP, 3 deaths occurred. Among them 2 deaths due to MAS and 1 death due to neonatal sepsis.

**Predicting Perinatal mortality by VAS and MBPP:** VAS/MBPP had a high specificity and negative predictive value thus implying that it is a reliable diagnostic test for assessing fetal well being. As a negative or reactive test is unlikely to be associated with adverse perinatal outcome. On the other hand, a lesser sensitivity and positive predictive value imply that it is relatively less reliable as a screening test for identifying a compromised fetus and need further evaluation for confirming fetal compromise. In terms of perinatal deaths it showed high sensitivity (100%) and high negative predictive value (100%). So it may be useful as a rapid admission test for fetal well being. This test was highly significant (P value < 0.05) for intrapartum fetal surveillance

## CONCLUSION

My study shows that VAS/modified biophysical profile is an acceptable means of early intrapartum fetal surveillance to predict the fetal outcome. I demonstrated the following,

When the VAS/MBPP was normal it gives reassurance that the fetal status was good with satisfactory perinatal outcome. When both parameters of MBPP (VAS/NST and AFI) were abnormal there was increased incidence of perinatal morbidity as well as mortality. Because of less sensitivity and positive predictive value, when both parameters were abnormal confirmation of fetal status with complete biophysical profile (or) MCA /UA Doppler should be done. VAS/MBPP can be used as primary early intrapartum fetal surveillance test to predict perinatal outcome and provide timely intervention in high risk pregnancies. VAS/MBPP is a patient compliant, cost effective and a less time consuming test.

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