Original Article

Prediction of fetal outcome in high risk pregnancy with a modified biophysical profile

Tara Sweta Arya[1*], Rashmi Thapa[2]

[1]Assistant Professor, [2]PGT, Department of Obstetrics and Gynecology, MGM Medical College and LSK Hospital, Kishanganj, Bihar, INDIA.
Email: dr.kumarbhaskar@gmail.com

Abstract

Background: Assessment of fetal well-being is important to arrive at timely diagnosis of fetal compromise and management to achieve optimal perinatal outcome. The modified biophysical profile (MBPP),combining Non stress test (NST) and the amniotic fluid index (AFI), is easier to perform and less time consuming. The present study was undertaken to study the effectiveness of modified biophysical profile in predicting perinatal outcome in high risk pregnancy cases. **Material and Methods:** 100 high risk pregnant women of more than 32 weeks attending the antenatal outpatient clinic or admitted to the ward were evaluated with the modified biophysical profile consisting of NST recording for 20 mins, followed ultrasound assessment of amniotic fluid volume, using four quadrant technique. **Results:** All 9 cases with both parameters abnormal had thick meconium stained liquor. When both parameters (NST and AFI) were normal 2 patients had APGAR score of <7, when both parameters were abnormal, 7 patients had APGAR score of <7.When both parameters were normal, perinatal morbidity was present in 39% cases, when both parameters were abnormal 100%cases had perinatal morbidity. **Discussion:** The BPP is a well-established method for antepartum fetal well-being evaluation. It can be used as a primary antepartum fetal surveillance test to predict perinatal outcome and provide timely intervention in high risk pregnancies.

Key Words: Modified biophysical profile, Non stress test, amniotic fluid index, perinatal morbidity, high risk pregnancy.

[*]**Address for Correspondence:**
Dr. Tara Sweta Arya, Assistant Professor, [2]PGT, Department of Obstetrics and Gynecology, MGM Medical College and LSK Hospital, Kishanganj, Bihar, INDIA.
Email: dr.kumarbhaskar@gmail.com
Received Date: 11/05/2017 Revised Date: 20/06/2017 Accepted Date: 02/07/2017

Access this article online	
Quick Response Code:	Website: www.medpulse.in
	DOI: 14 July 2017

INTRODUCTION

High risk pregnancies with maternal complications such as preeclampsia, eclampsia, anemia, oligohydramnios etc. are the major causes for perinatal loss. These pregnancies need to be identified for timely interventions to reduce the perinatal mortality[1]. Antenatal fetal evaluation is needed to identify high-risk pregnancy group which are at risk of suffering intrauterine hypoxia with resultant damage including death. Obstetricians have long searched methods of antepartum fetal evaluation that would be non-invasive, accurate and yield results that would be available immediately. The test should be safe, simple, reproducible, reliable and incurring minimal expense and inconvenience to both mother and child. Classical biophysical profile with all parameters (fetal breathing movements, fetal tone, fetal gross body movements, amniotic fluid volume and non-stress test) needs two phase testing by ultrasound and external Doppler monitor to record fetal heart rate, is more cumbersome, time consuming and expensive. The modified biophysical profile (MBPP) suggested by Nageotte *et al*[2] combines Non stress test (NST) as a short term marker of fetal status and the amniotic fluid index (AFI) as marker of long term placental function is easier to perform and less time consuming than classical biophysical profile. The fetal biophysical profile is one of the most widely accepted test for the evaluation of fetal well-being in such high risk cases. MBPP is considered to be as effective as complete biophysical profile[3]. The present study was undertaken to study the effectiveness of modified biophysical profile in predicting perinatal outcome in high risk pregnancy cases.

How to site this article: Tara Sweta Arya, Rashmi Thapa. Prediction of fetal outcome in high risk pregnancy with a modified biophysical profile. *MedPulse – International Journal of Gynaecology.* July 2017; 3(1): 50-53. http://medpulse.in/Gynacology/index.php (accessed 20 July 2017).

MATERIAL AND METHODS

In this prospective clinical study, 100 high risk pregnant women of more than 32 weeks attending the antenatal outpatient clinic or admitted to the ward of a tertiary care center over a period of one year were included.

Inclusion Criteria

1. Gestational age of 32 weeks or more
2. Preeclampsia
3. Anaemia
4. Pregnancies beyond 40wks
5. Oligohydramnios and polyhydramnios
6. History of previous still births
7. Clinically suspected IUGR
8. Heart diseases complicating pregnancy
9. Diabetes mellitus / Gestational diabetes
10. Decreased fetal movements

Exclusion Criteria

1. Normal or low risk pregnancy
2. High risk pregnancy of <32 weeks of gestation
3. Fetuses with congenital anamolies
4. Multi-fetal pregnancies

A detailed history of the pregnant women included in the study was taken and thorough clinical examination including recording of vital parameters, Systemic and obstetric examination was carried out. All preliminary investigations including ultrasound were done. The risk factor for which the patient was included in the study was noted. The patients were evaluated with the modified biophysical profile consisting of NST recording for 20mins, followed by amniotic fluid index measurement using four quadrant technique. The test was initiated at 32 wks of gestation or at the gestational age at which risk factors was identified. The test was repeated weekly or bi-weekly depending on the findings of the previous tests and the risk factors. The NST was performed with cardiotocogram (FM model – Viridia 50A, Hawlett Packard) in Semi-Fowlers position. Recording of FHR, fetal movements, uterine contractions was done. The trace was considered as reactive, if more than 2 fetal movements with acceleration of more than or equal to 15 beats/minute lasting for more than or equal to 15 seconds, with good beat-to-beat variability and no decelerations. If the reactive pattern was not recorded within 20 minutes period, the fetus was stimulated with VAST (fetal acoustic stimulator), or administration of a glucose containing beverage and the test continued for another 20 minutes period. If there is no reactivity in this extended period, the trace was deemed non-reactive. Real-time ultrasound scanning was performed using a 3.5 MHz sector probe (Logic α200) and general survey of fetus was done and presentation noted. The volume of amniotic fluid was measured according to the four quadrant technique described by Phelan et al. With the patient in supine position, uterus was divided into four equal quadrants by two imaginary lines. The vertical line corresponding to linea alba and a transverse line equidistant from pubic symphysis to the top of the fundus. The transducer was held vertically along the maternal longitudinal axis. An AFI was obtained by summing up the depths of largest vertical pockets, which is cord free in all the four quadrants. An AFI of >5 was considered normal and less than or equal to five or >18 was considered as abnormal. Patient's management was decided on gestational age, other risk factors and MBPP results. The last observation of MBPP before 1week of delivery was compared with outcome of pregnancy.

End points to assess outcome of pregnancy

1. Thick meconium staining of liquor
2. 5 minute Apgar score < 7 was considered as abnormal.
3. Admission to NICU
4. Perinatal morbidity
5. Perinatal mortality

Interpretation of MBPP and action

If both tests were normal – weekly fetal surveillance with MBPP. If both tests were abnormal – management depends on gestational age. If gestational age > 36 weeks – Delivery If gestational age < 36 weeks – Management is individualized.

If NST is reactive, but AFI is decreased – evaluate for chronic fetal conditions particularly congenital abnormalities and perform MBPP twice weekly. If AFI is normal and NST is non-reactive, further testing with a full BPP is indicated.

RESULTS

The study group included 100 high risk pregnant women of more than 32 weeks attending the antenatal outpatient clinic or admitted to the ward of a tertiary care center over a period of one year. Majority i.e., 49 cases were between the age group of 21-25 years followed by 23 between 26-30 years age group. 18 cases belonged to the age group between 16-20 years. 8 patients were aged between 31-35 years and two patients among the study group were aged >35 years. Most of the cases (46 cases) were in the 36-37 weeks of gestational age. 22 of the cases were in the 34-35 weeks of gestational age. 17 of the cases belonged to 40-41 weeks of gestational age and 9 of them to 32-33 weeks of gestation. 6 cases were in 38-39 weeks of gestational age.

Table 1: Age and gestational age of study population

Data	No. of cases (%)
Age in years	
16-20	18 (18%)
21-25	49 (49%)
26-30	23 (23%)
31-35	8 (8%)
36-40	2 (2%)
Gestational age (wks)	
32-33	9 (9%)
34-35	22 (22%)
36-37	46 (46%)
38-39	6 (6%)
40-41	17 (17%)

Mild and severe pre-eclampsia and gestational hypertension was present in 41 cases, decreased fetal movements were present in 14 cases, oligohydramnios and polyhydramnios were present in6 and 3 cases respectively. Bad obstetric history was observed in 19 cases and 12 cases were postdated. 3 cases had rheumatic heart disease and 2 cases had diabetes mellitus and hypothyroidism each. Out of 100 patients 58 of them had vaginal delivery and 42 of them had caesarean section. Out of the 58 patients who had vaginal delivery 46 of them (46%) had full term vaginal delivery and 12 of them (12%) had preterm vaginal delivery. Out of the 42 patients who had caesarean section 34 of them (34%) had emergency LSCS and 8 of them (8%) had elective LSCS. Out of the 34 cases who underwent caesarean section, majority of them (24%) had fetal distress as the indication for LSCS. Other indications were cephalo-pelvic disproportion (5%), scar tenderness in 4%, and breech presentation in 1% of the cases. A total of 62 babies had birth weight between 2.5-3.5 kgs followed by 34 babies weight was between 1.5-2.4 kgs. Those with <1.5 kg birth weight constituted 3and only one baby had birth weight more than 3.5 kgs. The modified biophysical profile was done in all 100 patients. It was found that both the parameters i.e., NST and AFI were normal in 68 patients (68%), both parameters were abnormal in 9 patients (9%), NST was normal and AFI was abnormal in 8 patients (8%), AFI was normal and NST was abnormal in 15patients (15%).

Table 2: MBPP profile of study population (n=100)

MBPP parameters	No. of cases	Percentage
Both parameters normal	68	68%
Both parameters abnormal	9	9%
NST normal AFI abnormal	8	8%
NST normal AFI abnormal	15	15%

In 68 cases with both normal parameters, 14 cases underwent LSCS and remaining 54 cases had vaginal delivery. In 9 cases where both the parameters were abnormal 6 cases underwent LSCS and 3 cases had vaginal delivery. In 8 cases with normal NST and abnormal AFI, 2 cases underwent LSCS and 6 cases had vaginal delivery, whereas, in 15 cases with abnormal NST and normal AFI, 12 cases underwent LSCS and 3 cases had vaginal delivery. The rate of caesarean section was found to be high when either both parameters were abnormal or when NST was abnormal. All 9 cases with both parameters abnormal had thick meconium stained liquor and 3 cases of the 68 cases with both normal parameters had thick meconium stained liquor. When NST was normal and AFI was abnormal only 1 patient of 8 had thick meconium stained liquor and when AFI was normal and NST was abnormal 9 patients out of 15 had thick meconium stained liquor. Out of 100 cases, APGAR score of <7 was observed among 21 cases. When both parameters (NST and AFI) were normal 2 patients had APGAR score of <7, when both parameters were abnormal, 7patients had APGAR score of <7, when NST was normal and AFI was abnormal 3 of the 8 patients had APGAR score of <7 and when AFI was normal and NST was abnormal 9 patients had APGAR score of <7.

Table 3: Meconium staining and APGAR score in relation to MBPP parameters

	Thick meconium stained liquor	APGAR score	
		<7	>7
Both parameters normal (n=68)	3 (4.4%)	2 (2.9%)	66 (97.1%)
Both parameters abnormal (n=9)	9 (100%)	7 (77.8%)	2 (22.2%)
NST normal AFI abnormal (n=8)	1 (12.5%)	3 (37.5%)	5 (62.5%)
NST normal AFI abnormal (n=15)	9 (60%)	9 (60%)	6 (40%)

When both parameters were normal, perinatal morbidity was present in 39 cases, when both parameters were abnormal 9 of them had perinatal morbidity. When NST was normal and AFI was abnormal perinatal morbidity was present in 3 cases and when AFI was normal and NST was abnormal, 9 of them had perinatal morbidity. Whenever both parameters were abnormal or even one of the parameters were abnormal, increased incidence of perinatal morbidity was observed. In cases with both normal parameters, perinatal mortality was not present in any of the cases, whereas, when both parameters were abnormal 5 of them had perinatal mortality. In cases with normal NST and abnormal AFI, perinatal mortality was not present in any of the cases and in cases with normal AFI and abnormal NST, 4 had perinatal mortality.

Table 4: Perinatal morbidity and mortality in relation to MBPP parameters

	Perinatal morbidity	Perinatal mortality
Both parameters normal (n=68)	39 (39%)	00
Both parameters abnormal (n=9)	09 (100%)	05 (55.5%)
NST normal AFI abnormal (n=8)	03 (37.5%)	00
NST normal AFI abnormal (n=15)	09 (60%)	04 (26.6%)

DISCUSSION

The MBPP is a well-established method for antepartum fetal well-being evaluation. It can be effectively used for antepartum fetal surveillance to detect compromised fetus at an early stage. The study group consisted of 100 pregnant patients with high risk factors in each of them. Hypertensive disorders were found to be the major risk factor in present study. In present study, the incidence of LSCS and vaginal delivery 14% and 54% respectively. In 9 cases where both the parameters were abnormal 6 cases underwent LSCS and 3 cases had vaginal delivery. The rate of caesarean section was found to be high when either both parameters were abnormal or when NST was abnormal. Miller et al[4] observed in their study that when test results were abnormal the caesarean section rate was high compared to those when MBPP was normal (36% v/s 13.2%, p <0.0001). Eden et al[5] also observed the similar results. In their study, 15.8% of caesarean section rate was seen when test results were abnormal, compared to 4.1% when the results were normal. All 9 cases with both parameters abnormal had thick meconium stained liquor and 3 cases of the 68 cases with both normal parameters had thick meconium stained liquor. Thus, it is seen that the incidence of perinatal morbidity with respect to meconium is increased when both MBPP parameters were abnormal, and more so when NST abnormal compared to AFI abnormal when individual parameters were considered. APGAR score of <7 was observed among 21 cases. When both parameters (NST and AFI) were normal only 2 patients had APGAR score of <7, whereas, when both parameters were abnormal, 7 patients had APGAR score of <7. This is comparable to Compitak K et al[6] study on 185 patients with high risk pregnancies. which had 33.3% of the babies with APGAR score of <7. In our study, when both parameters were abnormal 9 (100%) had perinatal morbidity. When NST was normal and AFI was abnormal perinatal morbidity was present in 3 cases and when AFI was normal and NST was abnormal, 9 of them had perinatal morbidity. Whenever both parameters were abnormal or even one of the parameters were abnormal, increased incidence of perinatal morbidity was observed. Patil SK *et al*[7] showed a perinatal mortality of 8 out of 650 patients (1.2%). Eden et al[5] had 5.94% of perinatal mortalities in their study. Donald et al[8], Matsura et al[9] and Arias et al[10] found MBPP as a tool for primary antepartum fetal surveillance test to predict the perinatal outcome in high risk pregnant cases. This study confirms these observations. The normal MBPP gives reassurance that the fetal status is good with good perinatal outcome. At the same time, abnormal MBPP indicates that the fetus may be compromised. Thus, MBPP can be used as a primary antepartum fetal surveillance test to predict perinatal outcome and provide timely intervention in high risk pregnancies.

REFERENCES

1. Rutherford SK, Phelan JP, Smith CV, Jacob N. The four-quadrant assessment of AFV: an adjunct to antepartum foetal heart rate testing. Obstet Gynecol. 1987; 70:353-56.
2. Nageotte MD, Michael P, Towers MD. Perinatal outcome with MBPP. Am J Obstet Gynaec. 1994; 170:1672-6.
3. Vintzileous AM, Campbell WA, Ingardie CJ, Nochimson DJ. The fetal BPP and its predictive value. Obstet Gynecol. 1983; 62:217-8.
4. Miller DA, Rabello YA, Paul RH. The modified biophysical profile: antepartum-testing in the 1990's. Am J Obstet Gynaecol. 1996; 174(3):812-7.
5. Eden RD, Scifert LS, Kodack LD, Trofatter KF, Killam AP, Gall SA. A MBPP for antenatal fetal surveillance. Obstet Gynecol. 1988; 71(3):365-9.
6. Compitak K, Pheungtavechok O. Diagnostic performance of a modified biophysical profile for fetal acidemia in high-risk pregnancies. J med Assoc Thai 2004; 87 (Suppl 3): 512-7.
7. Patil SK, Ghregrat RH, Khadilkar SS. Correlation of NST and AFV in antenatal fetal monitoring. J Obstet Gynecol India. 1998; 32(106):177-81.
8. Donald I, Assessment of fetal wellbeing, In:Renu Misra: practical obstetric problems.6th ed, New Delhi: BI Publications Pvt Ltd; 2007:465-85.
9. Matsura M, Murate Y, Hirano T, Sude K. The effects of developing ANS on FHR variabilities determined by the power spectral analysis. Am J Obset Gynaecol. 1996; 174:380.
10. Arias F, Daftary, Bhide, Practical guide to high risk pregnancy and delivery. 3rd ed. New Delhi: Elsevier, 2008; 17-22.

Source of Support: None Declared
Conflict of Interest: None Declared